BITS . . & . . . BYTES . .

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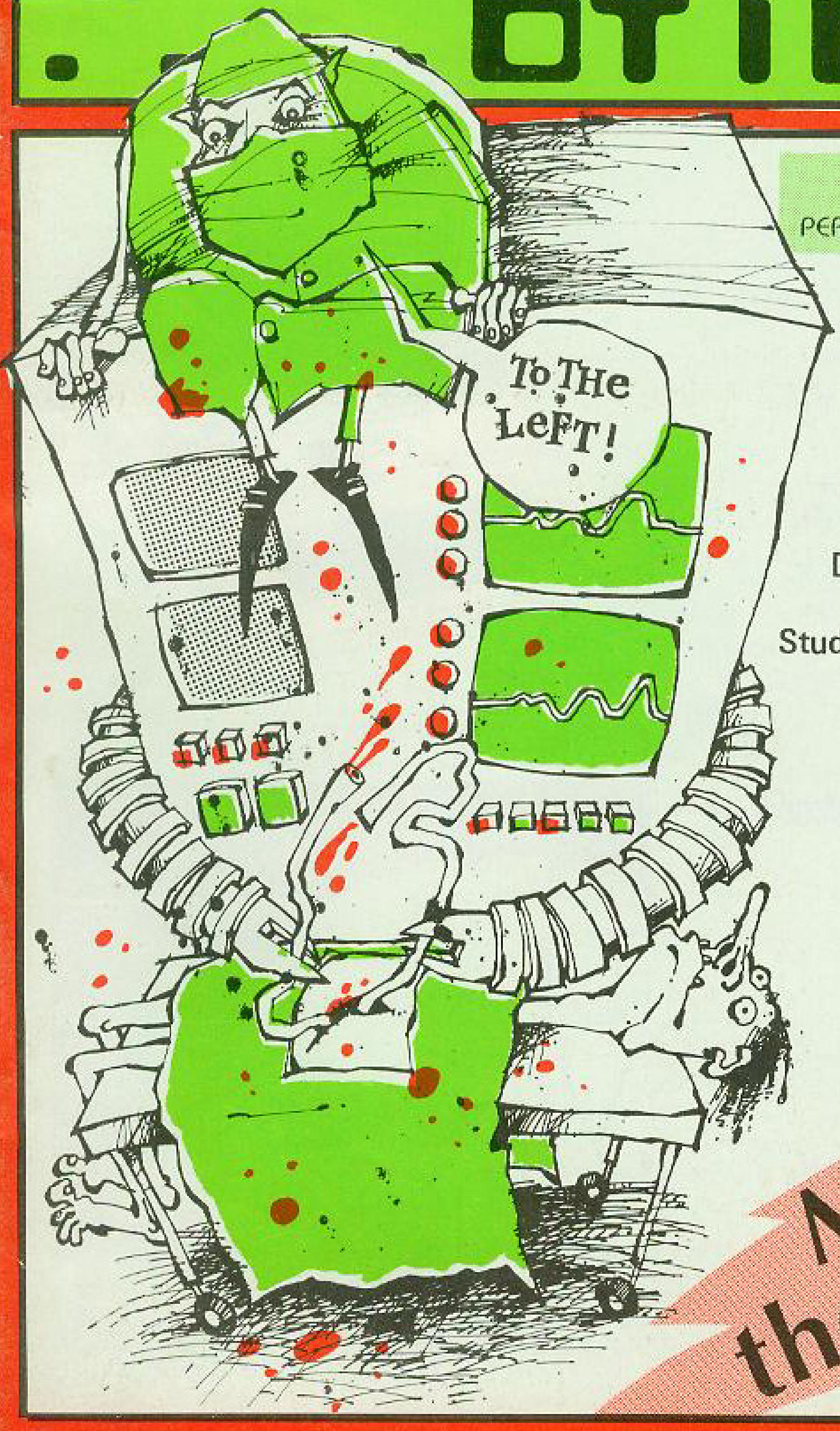
NEW ZEALAND'S PERSONAL COMPUTER MAGAZINE



COMPUTER GAMES

Basic BASIC for beginners

Designing business software

Students take computers home

N.Z. software

Schools competition starts this month

Micros in the surgery

bits & bytes

Contents

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Thanks for all the support

What a response-time! It seemed subscriptions were arriving even before people had received a copy of the first issue of "BITS & BYTES". At the time of going to print they were still arriving in copious quantities.

Thanks to all those people who have forwarded their subscription and all the letters of support - it's been very encouraging.

To those who haven't subscribed yet, we hope to hear from you soon; we need your support also.

If you have subscribed please pass the good word on to friends and relatives.

Don't forget we are interested in your comments, suggestions, contributions, and so on. We are also interested in hearing from beginners on the computerese they found confusing and would like explaining.

And don't despair adults. You, too, could soon have the chance to win a home computer. After comments from some readers that adults never have such a chance we are now negotiating to arrange a competition for adults with a home computer as a prize.

Thanks, too, too all those people who wrote supporting our stand on the 40 per cent computer sales tax. As a first step in our campaign against this ill-conceived and damaging tax, a copy of the first issue of "BITS & BYTES" was sent to every member of Parliament accompanied by a letter outlining our objections to the tax.

But it is believed pressure to reduce the sales tax is now being exerted from another corner.

The Industries Development Commission has recommended that the Government invest $6.5M and implement SALES TAX REDUCTIONS and make other incentives in the electronics industry.

We'll keep readers posted on any developments affecting the sales tax.

Coming up in BITS & BYTES

A look at the B.B.C. microcomputer that has taken the United Kingdom and other parts of the world by storm and is now available in New Zealand.

More on graphics, more on New Zealand software, more...

Computer Games

More nifty home-made games and puzzles from readers including some for the Sinclair.

Beginners

More BASIC for beginners and articles explaining the workings of different parts of a microcomputer plus each month we'll add more technical terms to our glossary.

Farmers

Sorry this column was left out this month. December's issue will include a supplement on microcomputers in farming. Any organisation with editorial and/or advertising material for this please contact the publishers soon.

Business

Want a small business computer but bewildered by the vast array of brands on the market? Next month John Vargo begins a series on how to select a microcomputer for your business.

Kerry Marshall continues his series on designing your own business software.

Micros in the office. A look at what accountants and sharebrokers are using microcomputers for.

Education

An Apple for the art teachers. Using a microcomputer to teach art.

Uses an Auckland school has found for microcomputers.

CALLING ALL SINCLAIR USERS!

"BITS & BYTES" would like to hear from Sinclair users.

We are interested in programs, articles, tips, and hints.

Share with other users the results of your work! And we pay for material used.

Before you write an article, though, drop a line to the following so that we don't get doubling up:

"Sinclair"
BITS & BYTES
Box 827
Christchurch

We look forward to hearing from you.

Micro Pro's Stable of Stars

Easy to use programs that perform everyday business tasks more efficiently—that's the aim of MicroPro's range of software products.

That aim seems to be succeeding too as MicroPro has the most popular CP/M (see glossary) based product line in the world according to the company's Pacific regional manager, Mr Michael Biel.

In New Zealand to conclude an agreement appointing Christchurch based company MicroAge primary New Zealand distributor of MicroPro products, Mr Biel said programming languages are becoming a relic of the past.

"The trend is to simplicity and user friendliness, which is exactly what our programs are aimed at," said Mr Biel.

At present MicroPro sells seven programs, all designed to serve the general applications needs of businesses and professionals, that can operate on virtually all CP/M running microcomputers including Apple II's with SoftCard and 80-column video board.

The most popular and well known of these programs is WordStar, which is the biggest selling word processing program in the United States and probably the world.

Other MicroPro products are:

MailMerge: Used with WordStar to produce customized form letters. Other uses include creating invoices and printing mailing labels.

SpellStar: Works with WordStar to find spelling and typing errors in word processing. It has a 20,000 word dictionary on a disk.

DataStar: A data handling program that allows the user to enter, retrieve and up-date data.

SuperSort: Sorts, merges and selects information from data files.

WordMaster: A comprehensive text editor used mainly by programmers to correct and alter programs.

CalcStar: A program that can perform a number of calculations to help solve numerical problems and prepare budget plans and sales forecasts. Similar to the popular VisiCalc (manufactured by VisiCorp).

New products that will be available before the end of this year are:

InfoStar: A report generator capable of manipulating multiple files.

StarIndex: An indexing tool for WordStar. It will be able to index paragraphs and create table contents.

StarBurst: A linking program for all MicroPro's products. With this the user will be able to call all the other programs.

This last product emphasises the interactive or family nature of MicroPro's products. Each program performs independently but they work very effectively when combined; most share similar file, format and keyboard functions.

Mr Biel says MicroPro will continue to produce general applications programs rather than specific applications such as accounting or real estate programs.

In its search for new programs the company is currently looking at communications software for linking microcomputers together.

The company is also looking at making its programs compatible with more microcomputers including the BBC microcomputer.

U.S. SCHOOLS

About 90,000 computers were available for educational purposes in American schools by the beginning of this year, according to the "New York Times."

This number is expected to increase at least three-fold in the next three years.

At least half of America's secondary schools and 14 per cent of elementary (primary) schools have put computers to work in their classrooms, the newspaper says.

Most schools are running courses in computer literacy and in rudimentary programming, but the range of software is growing rapidly, and their use has been extended to such courses as remedial reading and remedial maths.

70 JAPANESE

More than 70 Japanese firms are either making personal computers or are planning to begin production this financial year, according to the "Economist," of London.

A soaring home market is taking most of the production which is at the 100,000-units-a-year level for the firms of Nippon Electric Company (NEC), Sharp, Fujitsu, Toshiba, and Fujitsu.

Most of Japan's micro's have been based on Japanese copies of two American chips, the Zilog Z-80 or the Motorola 6800, but this year the following firms have introduced 16-bit personal computers based on the Intel 8086/8088 family: NEC, Sony, Kyocera (Kyoto Ceramic), Matsushita, and Hitachi.

A MAGNATE OF THE MICRO WORLD

By CATHY ARROW

"A computer," says Merl Miller, "is to be switched on and used. Like a car, you don't have to know what's inside to be able to drive it."

Merl Miller, President of dilithium Press, is from Beaverton, Oregon. He was recently in New Zealand to encourage booksellers to sell computer books.

Mr Miller addressed seminars in Auckland and Wellington for publishers and booksellers. In Singapore, his wife was addressing similar gatherings. Previously they had both been conducting seminars in Australia.

A feature of books from dilithium Press is the book level key. Of great benefit to customer selection and booksellers alike, it grades books into four levels of difficulty.

A good example of a level two book that requires no previous computer or maths background is "Computers for Everybody". Merl Miller says, "After reading it, people will know that computers are not frightening, evil, or nasty." Also he expects it will provide enough background to evaluate any other computer book.

Asked the real growth area of the future in books on computing, he replied, "Specific programs for specific computers."

The importance of software is appreciated by dilithium Press for it markets it.

Does Mr Miller see book retailers becoming obsolete? "Certainly not! Instead of paper books you will download programs and information or to your own system from the bookseller's computer. The coffee-table style of book will continue to exist in its present form."

Will having computers and communication modems in almost every home mean people will no longer read books?

People will continue to read, but the subject matter may alter, he says. Books will be plugged in to the home computer.

The attraction of the video screen for entertainment has already been proved. Hence books on the screen will become part of that entertainment.

Since being founded in 1978, dilithium Press sales have risen from 38,000 copies to 2.3 million copies in 1981. It has more than 90 titles in print and more than 30 in preparation.

Merle Miller graduated from the University of Wyoming with a bachelor's degree in industrial engineering. He did some graduate work in physics before drifting away from academic life.

He joined the United States Marine Corps and became a fighter pilot. While flying combat missions from an aircraft-carrier he was shot down in 1968.

Released from combat duty he promptly joined the anti-war movement and participated in demonstrations "bandages, medals and all," as he puts it.

His first job after the war was selling books in Boston for Prentice-Hall. He became their best salesman, anywhere in the world, and soon was a book editor. He worked for another publisher before setting up his own publishing house, Matrix Publishers, in Champaigne, Illinois.

The highly successful dilithium Press grew out of that venture as a separate publishing house specialising in computer books.

The name comes from the dilithium crystals that provided the power for the Starship Enterprise in the American television series, "Star Trek".

Dilithium Press is based in Oregon, and since its success (revenue for 1982 is expected to be $US2.4 million) there have been numerous takeover offers, all rejected.

"We're down to about five a week now," Mr Miller told an American newspaper recently.

beginners

Basic BASIC No. 1

By GORDON FINDLAY

INTRODUCTION:

BASIC is the most widely used language for programming 'micro' and 'personal' computers—not because it is the best language, or the easiest language (if there is any such thing) but because it is usually the only language available. The series is most definitely intended to be very simple—no tricks here! Perhaps it would be as well here to tell you that I am a teacher, and have been teaching computing (with a variety of languages and machines) for ten years or so.

HIGH AND LOW LEVEL LANGUAGES:

BASIC (which stands for Beginners All Purpose Symbolic Instruction Code, if anyone cares!) is a 'high-level' language. High-level languages are nearer to humans than to machines.

Any high-level language must be translated into a low-level equivalent which the machine does understand ('machine code'). This translation is done by your BASIC interpreter, which is most likely in permanent memory (ROM) in your machine.

High-level languages use relatively common words and symbols, and relate to the job in hand, whereas low-level languages relate directly to the actual machine instructions.

While low-level languages are fun for some, only a small percentage of programmers nowadays ever use them directly. But you must remember that this translation is going on.

Because this translation is being done by the machine, the machine expects the programmer to follow strict rules—imagine a human translator being asked to translate this sentence into French: 'Microcomputers put languages only under'. It would be impossible of course—the "English" doesn't follow the rules! In the same way, the interpreter in your micro cannot translate this statement:

```
10 PRINT A:B:C
```

(which doesn't follow the rules), but **can** translate and obey this statement:

```
20 PRINT A;B;C
```

Remember the translator when you get bogged down with the rules.

As a matter of interest, what happens when you do make a mistake in your program?

If the error is in the way you have used BASIC (like statement 10 above), it is called a SYNTAX ERROR. Your computer will soon let you know!

(Of course, there are other kinds of error. If the instructions you give the computer make sense, but don't do what you expected, you have made a LOGICAL error. These can be very hard to find, because the machine doesn't let you know.)

LIMITATIONS

Articles like this have a number of limitations. I will try to avoid anything which is machine-dependent, like graphics, sound, and the operating system. You must use your machine's manuals to find out how to load, save and edit programs, and such things as keyboard protocols, screen sizes and so on.

A monthly series is handicapped by the readers making far more progress in a month than can be included in a monthly article. Because of this I will deal with topics as they occur, rather than trying to build up a step-by-step development.

As well as learning the individual statements and constructions of BASIC, beginners have to learn **programming techniques.**

A program is just a carefully constructed set of instructions for a computer to follow. Breaking a problem down into individual instructions is an art rather than a science, and your best guide will be experience. But the experience need not . all be yours. You can learn a lot by reading programs you already have, or programs in books and magazines.

As for learning the details of BASIC, when in doubt, try it! If you have forgotten how something works, or are in doubt, write a tiny program just to check it out. Try to write a program which produces something on the screen, so you can check it at a glance.

WHAT IS A PROGRAM?

In BASIC, a program is a succession of lines, each with a line-number. The line-numbers are used to keep the statements in order, or to allow statements to refer to each other.

You may enter lines in any order and the computer will keep things straight. Usually you should use line numbers 10, 20, 30 . . . so that there are gaps in case you need to put other lines in.

The computer steps through the statements in order, from first to last, unless you change this by some means.

A FIRST PROGRAM

Type in and run this program:

```
10 PRINT 2+4
20 PRINT 6*5
30 PRINT 14/7
40 PRINT "THIS IS EASY"
50 END
```

Continued over

THE FIRST BYTE

By RICHARD WHATMAN

The idea of personal computing was for me an other-worldly concept.

When a keyboard came into view my eyes would glaze over, and the voices of those talking about computers sounded like the droning of fat blowflies on a summer's day.

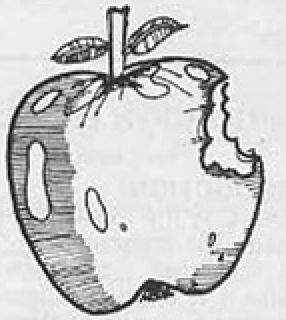
So it was with a mixture of incomprehension and trepidation when I first had to use an Apple II. The reason was an essay that had to be done on a word processor as part of a course on the micro-electronics revolution.

Our lecturer had shown the class how to use the beast, but the initial confrontation was a disaster. No-one else was in the computer room which was dim on a grey day. It was like stepping into some modern crypt where the musky smell of decay had been replaced by the peculiar feel of air conditioning and central heating.

The machines sat silent and brooding, while I felt sweat spring onto my forehead, waiting for inspiration.

Fear tickled my conscience when on turning on the power switch no encouraging lights or comforting machine hum began. Had destroyed it? Quickly I packed my things and slid out of the room.

The next effort was better as someone had pointed out the other switch on the wall. Hours of painstaking effort followed, but were rewarded as the essay took shape. As the essay grew so the primitive horror of the machine dissipated.



That brief exposure taught me two things: firstly, even the least mechanically, mathematically minded person can make use of microcomputers, and secondly, that the only way to get to grips with coming micro-revolution is through exposure to it.

Distrust and ignorance can only lead to a Canute-like embarrassment. The coup has begun and whether we as individuals or as a nation survive it intact will depend to a large extent on how much we know. Without knowledge of the changes ahead there can be no control, no planning. It is to be hoped the present generation of school children will be receiving some of the education I lack.

Many newspapers now have their own computer page or section. But the sort of information that is in newspapers does no more than spotlight developments, not explain how they can be used or what affect they will have.

That sort of information can be supplied in a magazine that caters for microcomputer technology. it can investigate and follow through the questions that newspapers identify. It can fill the gap that at present exists in New Zealand publications on microcomputer technology.

The questions that are posed by the developing access to, and capabilities of microcomputers have to be considered. To do that we must understand the uses and future of the "electronic wizardry". As one of the uninitiated I welcome the introduction of "Bits & Bytes".

Basic BASIC

From page 5

Notice how addition, multiplication and division are done—substraction is just as easy. Add the line:

```
15 PRINT 5—10
```

and list your program. Notice how the line 15 is slotted in between lines 10 and 20.

Print statements with these operations do not print out the operation, just the result.

Notice how the words (or 'text') are handled—with quotes. Anything included in quotes will be printed exactly as you type it in.

Change line 30 to read:

```
30 PRINT"14/7=";14/7
```

See how the text is followed by the result. Try changing lines 10, 20 and the new line 15 to print out the operation as well.

Incidentally, the semicolon in line 30 above is important.

What about several numbers on the same line? Get rid of the program above (typing NEW usually does it) and try this little test:

```
10 PRINT 4+3
20 PRINT 4—3
30 PRINT 4+3, 4—3
```

The first two lines print 7 and 1 on separate lines, the third line prints the two numbers on the same line.

Try this to see how to change the layout:

```
10 PRINT 4,3,2,1
20 PRINT 4;3;2;1
```

Commas separating numbers separate them into 'zones', while semicolons bring them more closely together.

So far everything has been printed on a new line for each PRINT. You can avoid starting a new line by putting a comma or semicolon at the end of the previous PRINT. Try this:

```
10 PRINT 3,4,
20 PRINT 5
30 PRINT 6
```

See how the comma at the end of line 10 forces line 20 to print on the same line as line 10?

GOTO STATEMENT

Computers can execute instructions far faster than you or I can write them. It was a major breakthrough when it was realised that statements could cause the computer to deviate from the straight through path.

In BASIC we can use the statement GOTO (followed by a line number) to send the computer back or forward in our program. Predict what will happen here, then check by running it.

```
10 PRINT "BASIC IS A MARVELLOUS"
20 PRINT "LANGUAGE FOR COMPUTERS"
30 GOTO 10
```

Obviously, the next step is to make the program stop!

More BASIC explanations from Gordon next month

School programmers right on target

Mark Tomlinson (left) and Michael Cree playing their game, Math-a-hit, at Mairehau High School

Two fourth-formers at the Mairehau High School, Christchurch, have developed a game program that's a hit with both their teachers and fellow pupils.

Called Math-a-Hit, it runs from disk on the school's three Apple II's, and is similar to Space Invaders. The difference is that the player has to complete a simple equation to identify the correct target.

The player shoots "missiles" at the target, which is one of the digits (numbers between 0 and 9) flying across the screen like space ships. The target digit is either the answer to the equation, or the sum of the digits if the answer is greater than nine. The player keeps adding the digits of the sum until a single digit is arrived at. For example if the answer were 123, the digit to be fired at would be 6; if the answer were 127, the digit target is 1(1, 2, and 7 are added to get 10, and then 1 and 0 are added to get the single digit, 1).

The program writers are Michael Cree, aged 15, and Mark Tomlinson, aged 14.

Math-a-Hit won a certificate of excellence at the recent Cantamath exhibition of the Canterbury Mathematical Association.

The program, written in machine language, takes up about 5K of memory.

If the player misses the correct figure as it moves across the screen, the game prints a comment such as "twit", and the scoring is loaded to take account of the great difficulty of figures moving across the top of the screen.

Ten points are deducted from the player's score if he or she misses a target at the top of the screen, and 30 points if one at the bottom is missed. A hit at the bottom earns 20 points and one right at the top of the screen, 40 points.

The motivation to work on games software arose when the teacher in charge of the school's computers, Mr Graeme Sauer, the head of the maths department, took away the games paddles from the computers in the hope of diverting attention away from games.

Michael and Mark rose to the challenge and wrote a program in BASIC allowing the keyboard to be used to fire the missiles. They found this too slow, so set about learning machine language.

"It's not at all difficult once you get the basics," says Mark.

But they concede it is very time consuming, both in the writing and the debugging, and after their work on Math-a-Hit have some advice for any other secondary pupils planning to work in maching language.

Make sure you put in plenty of documentation so that you can find your way round the programme," says Michael.

Michael and Mark's first machine-language game, Cosmo Wars, had typical space-game graphics, and they began work on Math-a-Hit when Mr Sauer suggested they develop something with an educational aspect for Cantamath.

The boys are now working on a system monitor for a VIC 20—on a school Apple II.

Mr Sauer sees a swiftly widening use for the computers in the school.

In the meantime, Mairehau has given two copies of Math-a-Hit to other schools, and would be interested in swapping it for software from other schools. (Those interested should write to Mr Sauer direct, or "BITS & BYTES" will forward inquiries to him.)

Stories about the activities of secondary pupils are welcomed by "BITS & BYTES". (Interesting programs are welcome, too.) We are keen to find out about the young people using the school computers: their achievements, problems, successes, and even failures (someone at another school may be able to help). Please tell us what's going on at your school in computing.

Just write to:
School News,
Bits & Bytes
Box 827
Christchurch.

LETTERS

The Poly, etc

Dear Sir,

I very much enjoyed your first issue and look forward to future copies.

There are several points I would like to make arising from articles in the magazine:

1: POLY computer. As a teacher and one of two computer enthusiasts in a medium-sized co-ed school, I have been asked several times what I think of the Poly. However, I still have not been able to lay my eyes, let alone my hands on one. The only time I know that these creatures appeared officially in the district was at an in-service day.

Unfortunately, computer enthusiasts and maths teachers were banned from attending! (I know of some who defied the ban, however). If Polycorp were really interested in selling its wares it should have set up a mobile display and visited all schools not just those in the larger population centres.

2: Some of us with minority-breed computers tend to get a little sick when article writers continually refer to the "big three" or "four" or "five".

Some of these big names are too costly for first time buyers who may appreciate mention of less costly alternatives. I would like to hear of less well-known brands even if only to know that they exist in this country. (I do have access to two of the big name machines, as well as to two lesser known brands).

3: Are there many people interested in FORTH? There are two of us at my school trying to assimilate FORTH and develop some mediocre talent in the language, but it is fairly difficult when the only outside stimuli are the odd articles in magazines, the "FORTH DIMENSIONS" magazine, and the various books and manuals which are available. We seem to have collected just about every book and article we have ever seen reference to (other than highly specialised applications) and we are running out of steam. One of us runs FORTH in EPROM and tape the other uses disk (5¼in). Please where are all the FORTHers?

Yours sincerely
N. R. Moir

READERS' LETTERS

We will welcome letters from readers on any topics related to computers or modern technology. Tell us your gripes, share your good news, pass on your tips. Please use one side of the page, well spaced. But use your own names. Pen names will be acceptable only in rare circumstances.

FREE CLASSIFIED ADS

BITS & BYTES offers subscribers free classified advertising. (This offer does not apply to commercial organisations or non-subscribing readers). Each subscriber is entitled to a free classified advertisement of up to 20 words in an issue. Each word above 20 will cost 20c. The conditions are: the advertisement must be written clearly with the subscriber's name and address and with the subscriber's signature. It must also bear the subscriber's subscription number (printed on the address label of the magazine) or accompany a subscription order or card.

Micro Monopoly

Even the great old game of Monopoly has gone electronic. Parker Brothers, which has sold more than 80 million games of Monopoly in America since 1934, has put an electronic accessory on sale.

Costing five times as much as the game set, the accessory, Playmaster, rolls the dice and keeps track of payer movement and property ownership. It also acts as banker, lending money at 10 per cent, and calling loans in at random.

It also adds music to the game, playing "We're in the Money" whenever a player passes Go, and collects an automatic bonus. It announces the recall of a loan with the first few bars of Beethoven's Fifth Symphony, and plays the "Last Post" when a player goes bankrupt.

WHODUNNIT?

A 16K deduction-game for Level II machines. Suitable for TRS-80, PMC-80, System 80, Video Genie, and other compatible computers.

Features:

- **Deduce who, where, and when.**
- **Five suspects and six rooms.**
- **On-screen floor plan.**
- **Easy-input single key-strokes.**
- **End of game scoring.**

The owner of Huntly manor, Sir Tinly Rich, has been murdered. Your assignment as inspector is to deduce who did it, where they did it, and at what time. Initial investigations show that the murderer had to be one of the five guests staying at the manor. The time of murder has been fixed between 1 p.m. and 9 p.m. Although the body was found in the hall, the murder must have taken place in one of the six rooms in the west wing.

When you RUN the program after loading using CLOAD, the title will be displayed. Pressing the I key will display the instructions. Pressing the B key will display a floor-plan of the house along with a guest list.

You will first be asked which suspect you wish to question. Just press the key for the first letter in their name. You don't need to type in the whole name or press ENTER (or NEW LINE). You can then press key 1, 2, or 3 depending on what you want to ask. If you think you know the killer, room, time or if you want to give up then press the 3 key. You will then be asked to press 1, 2, 3 or 4 if you think you know the killer, room, time or if you're baffled and want to know the facts. After you have correctly deduced all the facts your score will be displayed, otherwise the game continues. If you deduce the room or killer an asterisk will appear at the appropriate place on the screen. Similarly, once you have deduced the time it will appear on the screen under the floor-plan. This should help you keep track of your progress.

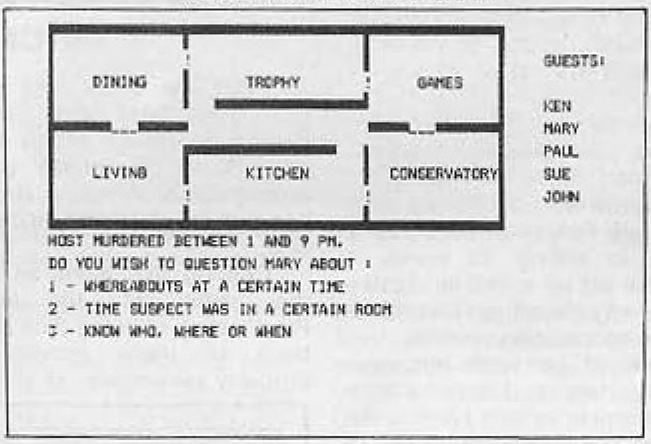
If you ask a suspect where they were at a certain time they will answer with one of the six rooms. They will also tell you who they were with and who they saw (Note the windows between each room). If they saw someone, that person must have been in one of the two rooms next door. The suspect may also say that the host was still alive or already dead in which case you have found the room of the murder.

(Warning: The killer may lie to you and although the others will not lie they may not always tell the whole truth.)

If you ask a suspect when they were in a particular room they will answer with all the times they were in that room (again watch out for the lying killer).

Copyright: Martin Downey

WHODUNNIT? SAMPLE OF SCREEN DISPLAY

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  W H O D U N N I T ?
 (C) 1981  MARTIN DOWNEY
??????????????????????????

10 RANDOM:CLEAR(20):DIMP(4,8),S$(4),R$(5):X=72
20 CLS:PRINTCHR$(23):PRINT@200,"?      WHODUNNIT      ?":FORI=8TO48STEP2:PRINT@64+
I,"?":PRINT@320+I,"?":NEXTI:PRINT@136,"?":TAB(24)"?";:PRINT@264,"?":TAB(24)"?";
22 I$=INKEY$:'CLEAR KEYBOARD
25 PRINT@642,"PRESS <I> FOR INSTRUCTIONS":PRINT@778,"PRESS <B> TO BEGIN"
27 GOSUB4000:I$=INKEY$:IFI$="B"THEN90ELSEIFI$<>"I"THEN27
30 CLS:PRINT@22,"W H O D U N N I T ?":PRINT
32 PRINT" THE OWNER OF HUNTLY MANOR HAS BEEN MURDERED. INITIAL INVES-"
34 PRINT"TIGATIONS SHOW THAT THE MURDERER WAS ONE OF THE 5 GUESTS STAY-"
36 PRINT"ING AT THE MANOR AND THAT THE MURDER TOOK PLACE IN ONE OF THE"
38 PRINT"6 ROOMS IN THE WEST WING BETWEEN THE HOURS OF 1-PM AND 9-PM."
40 PRINT"  YOUR JOB AS THE INSPECTOR IS TO DEDUCE WHO MURDERED THE HOST."
42 PRINT"WHERE THE MURDER TOOK PLACE AND AT WHAT HOUR."
44 PRINT"  YOUR SCORE DEPENDS ON HOW LONG IT TAKES YOU. IF A SUSPECT"
46 PRINT"MENTIONS THE HOST THEN YOU HAVE FOUND THE ROOM (UNLESS THE'RE"
48 PRINT"LYING). YOU CAN QUESTION AND GUESS AS OFTEN AS YOU LIKE. IF A"
50 PRINT"SUSPECTS SAYS THEY SAW SOMEONE THEN THEY MUST HAVE BEEN IN A"
52 PRINT"ROOM NEXT DOOR (NOTICE WINDOWS IN FLOOR-PLAN)."
54 PRINT"  ALTHOUGH THE INNOCENT SUSPECTS WILL BE HONEST. THE KILLER"
56 PRINT"MAY LIE TO COVER HIS/HER CRIME.":PRINT@997,"PRESS <B> TO BEGIN:";
58 I$=INKEY$:IFI$<>"B"THEN58
90 FORA=0TO4:READS$(A):NEXT:FORA=0TO5:READR$(A):NEXT
95 DATAKEN,MARY,PAUL,SUE,JOHN,CONSERVATORY,KITCHEN,LIVING,DINING
97 DATATROPHY,GAMES
100 DATA246,310,374,438,502,421,405,388,132,149,168
110 FORI=0TO4:READSS(I):NEXTI:FORI=0TO5:READRR(I):NEXTI
314 CLS:FORI=0TO5:PRINT@RR(I)+1,R$(I);:NEXTI
320 FORX=0TO30:SET(X,0):SET(X,13):SET(X,26):NEXT
330 FORX=30TO70:SET(X,0):SET(X,10):SET(X,16):SET(X,26):NEXT
340 FORX=71TO100:SET(X,0):SET(X,13):SET(X,26):NEXT
350 FORY=1TO25:SET(0,Y):SET(100,Y):IFY<10ORY>16SET(30,Y)
360 SET(70,Y):NEXT:FORA=0TO5:RESET(31+A,10):RESET(64+A,16):NEXT
365 FORI=11TO15:RESET(70,I):NEXTI
370 POKE15625,95:POKE15624,95:POKE15623,95:POKE15439,33:POKE15523,33
380 POKE15658,95:POKE15657,95:POKE15656,95:POKE15823,33:POKE15843,33
390 PRINT@119,"GUESTS:";:FORI=0TO4:PRINT@SS(I)+1,S$(I);:NEXT
400 PRINT@576,"HOST MURDERED BETWEEN 1 AND 9 PM."
460 FORK=0TO4:P(K,0)=RND(6)-1:NEXT:FORL=1TO8:FORK=0TO4
520 A=RND(6)-1:IFA=P(K,L-1)THEN520
530 P(K,L)=A:NEXTK,L:M=RND(5)-1:T=RND(9)-1:R=P(M,T)
610 PRINT@630,:PRINT@640,"INSPECTOR WHO DO YOU WISH TO QUESTION ?";
```

```
612 I$=INKEY$:IFI$=""THEN612
615 S=5:FORI=0TO4:IFI$=LEFT$(S$(I),1)THENS=I
617 NEXTI:IFS=5THEN612
620 S1$=S$(S):PRINT"   ":S1$:FORI=1TO100:NEXTI
650 GOSUB3000:PRINT@640,"DO YOU WISH TO QUESTION ":S1$:" ABOUT :"
660 PRINT"1 - WHEREABOUTS AT A CERTAIN TIME"
670 PRINT"2 - TIME SUSPECT WAS IN A CERTAIN ROOM"
680 PRINT"3 - KNOW WHO, WHERE OR WHEN"
685 I$=INKEY$:IFI$=""THEN685
690 A=VAL(I$):IFA<1ORA>3THEN685ELSEC=C+1
700 GOSUB3000
710 ONAGOTO720,990,1200
720 PRINT@704,S1$;", WHERE WERE YOU AT ":CHR$(95):CHR$(95):" ? (KEY 1-9)";
730 I$=INKEY$:IFI$=""THEN730
740 T1=VAL(I$):IFT1<1ORT1>9THEN730
750 PRINT@704,S1$;", WHERE WERE YOU AT":T1:"O'CLOCK ?         "
760 T1=T1-1:R1=P(S,T1):IFS<>MTHEN860
790 IFRND(4)<1THEN910
800 R1=RND(6)-1:IFRND(8)=4THENT2=10ELSET2=0
820 GOTO890
860 T2=T1:IFR1<>RTHEN910
880 IFRND(10)=1THEN910
890 IFT2<TTHENPRINT" THE HOST WAS STILL ALIVE."
900 IFT2>TTHENPRINT" THE HOST WAS ALREADY DEAD."
910 PRINT"I WAS IN THE ";R$(R1);" ROOM."
920 FORK=0TO4:IFK=STHEN960
940 IFP(K,T1)=R1PRINT"I WAS WITH ":S$(K);". ";
950 IFABS(R1-P(K,T1))=1PRINT"I SAW ":S$(K);". ";
960 NEXTK:GOTO610
990 PRINT@704,S1$;". WHAT TIME WERE YOU IN <ROOM> ";
1000 I$=INKEY$:IFI$=""THEN1000
1010 GOSUB2000:IFX=6THEN1000
1015 PRINTR$(X)
1020 IFS<>MTHEN1110
1040 IFRND(10)=1THEN1110
1050 T1=RND(9):GOTO1090
1070 IFT1=FPRINT"I WAS NOT IN THAT ROOM.":GOTO610
1090 PRINT"I WAS IN THAT ROOM AT":T1:GOTO610
1110 K=0:FORB=0TO8:IFP(S,B)<>XTHEN1170
1140 IFK=0PRINT"I WAS IN THAT ROOM AT";B+1;:K=1:ELSEPRINT", ";B+1;
1170 NEXT:IFK=0PRINT"I WAS NOT IN THAT ROOM."
1180 GOTO610
1200 C1=C1+1
1220 GOSUB3000:PRINT@640,"DO YOU KNOW: 1-KILLER  2-ROOM  3-TIME  4-BAFFLED "
1230 I$=INKEY$:IFI$=""THEN1230
1240 A=VAL(I$):IFA<1ORA>4THEN1230
1260 ONAGOTO1265,1410,1340,1550
1265 IFH=1THENC1=C1-1:PRINT"YOU ALREADY KNOW THE KILLER IS "S$(M)".":GOTO610
1270 PRINT"  THE KILLER IS ?  ";
1272 I$=INKEY$:IFI$=""THEN1272
1280 X=5:FORA=0TO4:IFI$=LEFT$(S$(A),1)THENX=A
1285 NEXTA:IFX=5THEN1272
1287 PRINTS$(X)
1300 IFM<>XTHEN1530
1310 PRINT"  YOU HAVE THE KILLER INSPECTOR.":H=1
1315 PRINT@SS(M),"*";
1320 IFH=1ANDH1=1ANDH2=1THEN1500ELSE610
1340 IFH1=1THENC1=C1-1:PRINT"YOU ALREADY KNOW IT WAS AT":T:"O'CLOCK":GOTO610
1350 PRINT"  TIME OF MURDER ?  ";
1360 I$=INKEY$:IFI$=""THEN1360
1365 T1=VAL(I$):IFT1<1ORT1>9THEN1360
1367 PRINTT1:"O'CLOCK"
1370 IFT1-1<>TTHEN1530
1380 PRINT"  INSPECTOR YOU HAVE THE RIGHT TIME.":H1=1
1390 PRINT@576,"HOST WAS MURDERED AT":T+1:"O'CLOCK.        ";:GOTO1320
1410 IFH2=1THENC1=C1-1:PRINT"YOU ALREADY KNOW IT WAS IN THE ";R$(R);" ROOM.":GOT
O610
1420 PRINT"  ROOM OF MURDER ?  ";
1422 I$=INKEY$:IFI$=""THEN1422
1430 GOSUB2000:IFX=6THEN1422
1440 PRINTR$(X)
1450 IFX<>RTHEN1530
1460 PRINT"  INSPECTOR, YOU HAVE THE RIGHT ROOM.":H2=1
1470 PRINT@RR(R),"*";:GOTO1320
1500 PRINT@704,"  YOU'VE SOLVED THE MURDER CASE INSPECTOR."
1505 S=100-C-8*(C1-3):IFS<0THENS=0
1507 S%=S
1508 BL$="":IFC1-3>1THENBL$="S"
1510 PRINT"IT TOOK YOU":C:"QUESTIONS AND":C1-3:"BLUNDER":BL$;"."
1512 CM$="TERRIBLE.":IFS>30THENCM$="NOT VERY GOOD."
1513 IFS>49THENCM$="NOT TOO BAD.":IFS>62THENCM$="GOOD."
1514 IFS>75THENCM$="VERY GOOD.":IFS>85THENCM$="EXCELLENT."
1515 PRINT"THAT GIVES YOU A SCORE OF":S%:"%. THAT'S ":CM$
1520 GOTO1590
1530 PRINT"  INSPECTOR, YOU ARE HIGHLY INCOMPETENT. TRY AGAIN."
1540 GOTO610
1550 PRINT@704,"TOO BAD INSPECTOR.":PRINT"THE FACTS ARE:"
1570 PRINTS$(M);" KILLED THE HOST AT":T:" O'CLOCK IN THE ";
1580 PRINTR$(R);" (ROOM)"
1590 PRINT"DO YOU WANT A NEW CASE ?";
1595 I$=INKEY$:IFI$="Y"THENRUNELSEIFI$<>"N"THEN1595
1600 CLS:END
2000 X=6:FORA=0TO5:IFI$=LEFT$(R$(A),1)THENX=A
2010 NEXT:RETURN
3000 PRINT@638,:PRINT:PRINT:PRINT:PRINT:PRINT
3010 PRINT"                         ";:RETURN
4000 POKE15360+X,32:FORJ=1TO10:NEXTJ:POKE15360+X,63
4010 IFX<112THENX=X+2:RETURN:ELSEIFX>328THENX=X-2:RETURN
4020 IF(X=328)OR(X=264)OR(X=200)OR(X=136)THENX=X-128
4030 X=X+64:RETURN
```

business

How to design a system for business

By KERRY MARSHALL

Micro fans, who have been pounding the keys for some time, will have encountered the situation where a business acquaintance pops the question: "You know all about these computer things. How about writing a 'program' to do my accounts?"

What follows is an outline of how you can take up such an opportunity and produce a system that is satisfying for you and the acquaintance/client.

The point at which most businesses begin to consider the use of a computer is when a problem arises. These problems typically relate to the volume of information they have to process, the complexity of the process they require, or the need for speedier information. When you are approached, therefore, to design/write a computerised version of the system, it is essential to get a good understanding of the way in which the job is done at present.

Before beginning the investigation, however, sit down with your client and get a clear definition of the problem and try to set out what the objectives of the system are. Doing this will focus attention on the problems and here you must be inquisitive. There are many causes of problems in information flows and you need to identify all the existing problems so that they do not get carried over into your new system.

A typical example of a problem that will not be solved by a computer system is a debtors system that is producing monthly accounts later than desired - perhaps caused by delays in the document flow at various stages (foreman holding dispatch dockets until month end; or an invoice clerk doing extensions at end of week instead of daily).

Figure 1: Grid for the analysis of data

	Customer order number	Delivery date	Sales order number	Customer name	Customer address	Product description	Quantity ordered	Quantity delivered
Customer order	✓	✓		✓	✓	✓	✓	
Sales order	✓	✓	✓	✓	✓	✓	✓	
Delivery docket	✓	✓	✓	✓	✓	✓		✓
Sales invoice	✓		✓	✓	✓	✓		✓
Stock report			✓			✓		✓
Sales summary			✓	✓	✓	✓		✓

Another example is the introduction of new production methods which make a manual costing system inadequate to cope with new reporting requirements.

A second point to clarify at this stage is the objectives of the new system. These are needed for two reasons. Firstly, they help clarify the scope of the new system (e.g., does an invoicing routine produce inventory information), and secondly they provide a basis for measuring the success, or failure, of the system once it is operational. Where possible, quantify these objectives - i.e. "reducing outstanding debtors by $10,000", or "reducing collection time to 30 days", is better than "improving debtors collection".

Before discussing the process of finding out what goes on in the business, it is worth looking at some of the characteristics of information. Every business, large or small, needs information which can come from inside or outside the organisation. Outside information, such as award rates of pay or tax rates, must be allowed for, as well as the obvious internal information like hours worked, items dispatched.

Every business must produce information for a variety of reasons.

External requirements for information are generally mandatory since they typically are required by regulation. The Government requires companies to produce data for taxation amongst other things,

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Businessman's best friend.
As your company grows it's going to need a computer to match.
A computer that has the capability to handle the problems of the moment, and then, adaptability enough to grow right along with you.
You've got to choose a computer to suit your company carefully . . . just as you would a business partner.
Introduce yourself to Commodore.
A Commodore business system will give you that essential growing-company adaptability . . . you won't have to 'reprogram' your business to fit.
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YOUR information under YOUR control.
It's time to make friends with Commodore.
In a very short time, you'll discover that your Commodore is one of the best business friends you ever had.
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BBC, Sirius star in Hobart

By GERRIT BAHLMAN

The ninth Australian Computer Conference in Hobart, Tasmania, recently provided an opportunity for computer professionals to gather and share their experiences as well as catch up on the major developments in their various fields.

There can be no doubting the variety of the fields. Three basic divisions were made in staging the conference. The main conference was restricted to those professionally involved in the technology; a schools symposium was held towards the end of the conference for educational applications of computing; and an exhibition for manufacturers was held at two large venues in the centre of the city. Initially, this was restricted to conference delegates but the public were allowed to view the displays at the end of the week.

Many delegates at the main conferences were interested in buying, or at least viewing, with a purchase in mind, the large number of machines on display. Interestingly, the exhibition was dominated by microcomputers, with some large mainframes such as the Wang Alliance system and the Perkin Elmer Cadam system.

IBM celebrated its fiftieth anniversary in Australia by exhibiting its product range from 1932 to the present day. There were actual and scale models of some of the company's past product lines, including meat scales, dial recorders, time clocks, card readers, sorters, electronic counters, the 650, 1401, and 360 computer systems. The highlight of the display was the new I.B.M. Personal Computer, which has not yet been released in Australia or New Zealand, although it is rumoured that release in New Zealand is timed for early 1983 at a price of about $8000.

ICL was another mainframe company that used the exhibition to launch a new networking computer system. Networked systems allow a number of computers to talk to each other and so such systems are particularly useful for implementing microcomputers as intelligent terminals that can work by themselves yet, use large facilities when needed.

Digital Equipment is another company which is beginning to incorporate microcomputers into its larger systems. Its new microcomputer is designed to hang off a central mainframe machine, the VAX, and act as an intelligent terminal.

The most impressive, memorable display was by Prime. Apart from the size of its stand and machinery, delegates were introduced to the white, Prime robot. A competition to give him a name was launched at the exhibition and some of those were hilarious. The robot has been used for television advertising and is made of brilliant white plastic, so "Snowbyte" became very popular. An actor was employed to wear the robot's costume and provided a most impressive element of fun.

One of the more popular displays was that of Natsemi Advanced Systems. In a haven of cultured calm amidst the wealth of activity. Bach was played by a string quartet and free champagne poured. The area was cleverly sealed off with the salesman dressed toppers and tails. The machine the company was marketing was a talking cash register (American accent of

Continued opposite

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The Tandy stand at the Hobart conference

course!), in which the item being purchased was waved across the detector, at varying angles, and the cash register "told" the price of the item.

THE MICROS

The range of personal computers was outstanding. Certainly, much greater than can be found in New Zealand. The largest stand was from Tandy Corporation. It makes the TRS 80 range, which is very popular in Australia. Retail outlets of considerable size are to be found in most cities. The new TRS80 Color Computer was on display and impressed me because of the combination of price and availability.

Barsons Computers, which has an Auckland branch, displayed the much discussed BBC, Micro and the up-market Sirius microcomputer. Both of these are beauties. In particular, the cheap, and oh-so-easy-to-program BBC micro made my mouth drool. It looks awful. One of those machines that is only a keyboard. But, when the colour graphics started to pour out of the attached colour monitor I stopped worrying about appearances. The Acorn Proton is the formal name for the BBC Micro and it is now the favoured machine for educational use in Australia. It features high-resolution graphics, programmable keys, high-speed RS232 interface, centronics port, four analogue inputs, plug in language ROMs and, the best feature, it is capable of networking 250 computers up to 1km apart using the conet networking language ROMS. More than 400 of these machines are in use in Australia after its release just six months ago.

Commodore displayed its new colour computer with features like high resolution graphics, synthesised sound generator and 'Sprite' graphics. The Super PET was on display and I couldn't resist the invitation to have a fiddle. It is not a home computer but impressed me with its large range of interpreted languages. Some of the languages supplied interpretively on this machine were: APL, FORTRAN, Pascal, and Assembler. The VIC20 was also on display with a "win a VIC20" competition. I haven't heard yet but, I'm still hoping.

Incidently, the VIC20 shouldn't be scoffed at. The sales in Britain are booming and its certainly at the right place for someone wanting a lot for very little.

Finally, the Apple computer was there in force. Mainly the model III but they did show the Apple robotic turtle running on the language, LOGO. It looked like great fun but I didn't get a chance.

The robotic turtle has a pen suspended from its middle and is circular in shape. There are sensors around its body which prevent it trying to smash itself to pieces and, of course, it has a series of wheels and electric motors which are controlled by the Apple computer. The computer is connected to the robot by the same sort of multiple wire, flat plastic strip, that connects the disk units to the computer. It did not look all that complicated and I would predict that a number of people will be making their own in New Zealand now if they haven't already done so.

A number of other brands were on display, but most of those were Australian-only machines which we are unlikely to see here. The Poly computer was also on display and appeared to impress but, once again its price precludes it from the purely home computer market.

HAND-HELD COMPUTER USERS!

Micros don't finish at those of desk-top size. "BITS & BYTES" is interested in hand-held computers, too.

We would like to hear from any enthusiasts of these mini micros . . . Sharps, Hewlett-Packard, the brand is immaterial.

Other fans want to hear about what you've been doing with programs and applications. They've written telling us so.

We will pay for good contributions for publication. Before you start writing, however, drop us a note so that we don't get doubling up of efforts.

Write to:
"Hand Held Micros"
"BITS & BYTES"
Box 827
Christchurch

C'mon mini-micro fans: let's hear from you!

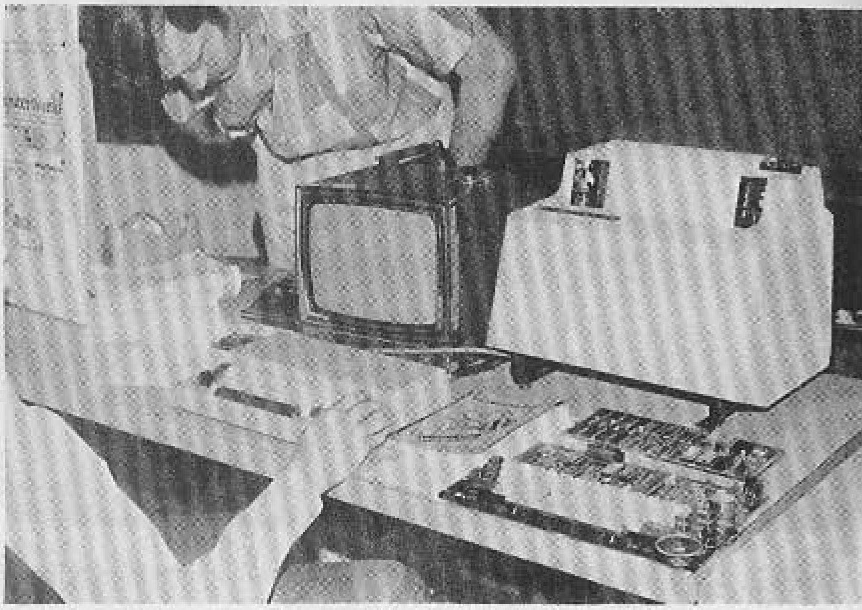
Canberra exhibition

More than a dozen hardware and software suppliers filled the large lounge with eight user groups for the Canberra Microcomputer Exhibition at the Canberra Workers' Club. Together, they represented the microcomputer scene in the Australian capital.

Several new locally made products were on display for the first time. These included a full 100 character per line upgrade for the Osborne 1 computer and education package for the VIC, catering for a range of ages from kindergarten to teenagers with such titles as "Young Maths", "Mutiplication and Series", "Addition, Subtraction and Numberline", and "Spellstart".

One of the better-known Canberra products was the Microbee computer. Retailing for Australian $399, it looks set to be the leading small micro in its field. Recently 3,000 were ordered by the New South Wales Education Department for its schools. As soon as it can catch up with local demand Applied Technology will send 10,000 to the United States.

Other exhibitors came from as far away as Sydney and Melbourne to show their products. These included the new Olivetti series L1 model M20 business computer, the Carrot Computer, which is an Australian designed system complete with hard disk drive for less than Australian $20,000, and the BBC micro, UK, which has great colour and graphics capabilities.



The Applied Technology stand featuring the Microbee at the Canberra microcomputer exhibition

The organisers of the one day exhibition, the Canberra branch of the Australian Computer Society, Microprocessor Special Interest Group, were overwhelmed by the public response. The convener of the exhibition, Mr Chris McEwan, said, "We are amazed that well over 3,500 people have come through the door.

"We believe there has been a startling change in people's response to computers," he said. "What people are seeing at this exhibition is what will be as common as the telephone in the next 10 years. It's the furniture of the future."

— **Selwyn Arrow**

A Peach of a computer at show

The Auckland Office Equipment and Business Efficiency Show, organised by XPO Exhibitions, was held at the Auckland Showgrounds on August 24, 25 and 26 open from 10 a.m. to 6 p.m. each day, it attracted more than 8500 people.

An excellent cross section of big and small-business systems were represented.

Software covered both the average office accounting procedures and more sophisticated specialised applications. A variety of software for various machines covering normal business routines was on show.

Sophisticated specialist area application software was also readily available.

More than 322 product lines from throughout the world were on display.

Continued opposite

From opposite page

One of the main areas of attraction on many stands was without doubt the wealth of micro and minicomputers on display, some of which had only just been released on the New Zealand market.

The NEC PC-8000 (Peach) is promoted as a beautifully designed computer, a veritable cherry blossom from the Far East. Its keyboard is user friendly for children and adults with little typing expertise, although excruciatingly strange to touch typists. By hitting a button, you can switch the keyboard layout from the traditional "QWERTY" format to an alphabetical arrangement. You can also move the cursor to any part of the screen and insert or delete characters there (with no need for special software) such is the extensive editing capability.

The Osborne 1 with keyboard, disk, and small screen in one very compact unit, lightweight and portable, is most suitable for transporting between office and home.

Hitachi's Personal Computer, with its excellent graphics, has as standard many items which other machines have as add ons.

The complete VisiSeries from Visicorp encompassing VisiCalc—VisiFile—Visi Schedule and VisiDex was on display and is now available in New Zealand.

ICL's powerful, scientific graphics computer, PERQ, held its audience captivated by its incredible display of on-screen merging and manouvering, using finely detailed graphics.

There were certainly a lot of Apples and plenty of programs for picking from.

The N.Z.P.O. Mitel electronic switchboard attracted a lot of interest. Provisions are made for speedy and accurate attention to all calls, making it an asset to both firms and customers. There was certainly a lot on display for the businessman and of interest to the personal computer user.

Post that subscription card today

Karamu High lets pupils take micro's home

By N. R. MOIR

The saga of microcomputers at Karamu High School, Hastings, began late in 1979, when the writer decided it was about time learned something about computing by buying a personal computer. When this finally arrived, it was shown off to certain colleagues of much more influence than the writer. About the same time the first advertisements for the Sinclair ZX80 appeared in the British electronics magazines.

This was the signal for the assault to begin. The head of the mathematics department (Mr P. R. Walker), with two other interested senior teachers, managed to persuade the school principal to spare precious funds for a speculative purchase. A mail order was dispatched, and, in time, the kitset arrived, was assembled with some trouble, and was put into operation. It was viewed with some suspicion all round. How could such a tiny "toy" be of any benefit? Even the writer looked at it in askance, having just spent several thousand dollars on a "useful" microcomputer.

However, over the next few months, the ZX80 became very popular with Mr Walker and a number of students, so that when the disposal of funds from the next school fund-raising day was discussed mathematical eloquence won the day and the "computing fraternity" (all half-dozen or so) were granted half the funds. Immediately action was taken to order another six ZX80's. An order which was almost as promptly cancelled when the advertisements for the new ZX81 appeared. A far better machine it was decided - the ZX80 was obsolete.

With some planning, Mr Walker, now in charge of the nominal computer department, decided to order direct from Britain and effect any necessary changes (to the

About the author: My introduction to computing was through a correspondence course run by Massey University on introductory computing. Soon after the course began I decided to buy my own computer. It eventually arrived and I have not had time to regret the decision. My main interest is in the programming languages. At present both Mr Walker and I are delving into FORTH and looking forward to using the different languages available on the Apple. My own system is an Ohio Scientific C4PMF (24K memory, single 13cm disk). I hope to describe the system and my plans for its development in a future article.

modulators) once the kitsets had arrived. A local television serviceman had been persuaded to help, a decision he may have regretted at times over the next year as problems mounted.

After some setting-up difficulties were overcome the next six ZX81's were pressed into service. In the meantime another newcomer also arrived. Mr Walker had been seriously bitten by the computing bug (and the writer couldn't always be carting his equipment around to the Walkers so that they could play Space Invaders), so he invested some of his hard-earned savings in a Pegasus, the Auckland-produced kitset computer which fell on hard times. Soon after, more of the school funds from the initial grant were used to buy a Pegasus for school-based use.

Ah, I have forgotten the micromicros: the Sharp PC1211 hand-held computers bought early in 1981. Three of these with a printer are available to staff and students.

The organisation of the use of the computers derives from the initial decision by Mr Walker, after consultation with other interested members of staff, that school-based computing was to be in the direction of computer literacy and programming and not the favoured computer-appreciation type of course where pupils are told about a computer and perhaps get a chance to do a few lessons in the little time they have available on the few computers available.

Instead, it was decided to opt for a larger number of small computers which could be taken home by pupils and plugged into their own television sets, thereby not only using the computers more but also involving other members of the pupils' families.

At present, of the 17 computers, one ZX81 with 16K memory and 22 cm monitor plus the Pegasus and 22cm monitor are permanently on the mezzanine floor of the school library. They are available for use by seniors during study periods and breaks, as well as to approved pupils from the fourth form. These computers tend to be in constant use during the day and at lunchtime. Unfortunately, library hours preclude longer use at this stage.

There are two ZX81's with 16K memories and converted televisions (acting as monitors) in Mr Walker's and the writer's rooms. These are for use by seniors and approved juniors for the full lunch-hour but also during class times both as teaching aids in maths and as tutorial machines for helping pupils overcome programming problems.

The rest of the ZX81's, the ZX80 (now converted to 8K BASIC) and the Miniscamp are available to selected pupils from the fourth and occasionally the third forms. Pupils are permitted to take the computers home for up to one week at a time to become familiar with their operation. One of the Sharp PC1211's is used similarly, the rest being used by the seventh form applied maths group with the printer.

Obviously there are advantages and disadvantages with the approach used at Karamu High School.

The disadvantages tend to lie in the difficulty of supervising the pupils in their approach and advancement in the use of the computers. Even with more than 50 pupils having had use of the ZX81's for several weeks, it is doubtful that more than a dozen have made more than perfunctory progress in such an informal setting. These pupils would probably benefit from a more structured approach.

Unfortunately, the computer section has no allotment of time and is funded through the maths department so that a formal approach, even through a voluntary club, would be difficult to sustain.

The problem of matching computer to television, and the hardware bugs which arise when more memory is added by piggy-backing chips, form major obstacles to efficient use of the computers. However, once a suitable match has been found, that computer is given to the particular pupil in subsequent issues of the computers.

To my mind the advantages of such an approach lie in the freedom with which the pupils can approach the computers, without the strictures of having to complete certain tasks in an alloted time at school. The pupils are able to experiment with the computers very much in the way most hobbyists tend to, finding for themselves many of the possibilities of the computer. The informal use of the computers also tends to remove the stigma that tends to accompany compulsory lessons, no matter how novel the equipment used.

To summarise, we decided to avoid the CAI or CAL approach to the use of computers, preferring to concentrate on introducing children to the technology through programming and controlling the computer. There has been mixed success, and some degree of criticism from other staff members who see computers as some sort of advanced video system running packaged software (these people we hope will be satisfied with one of the cheap Apples).

If we were approaching the situation again I believe the solution would have been similar, with, perhaps, more emphasis placed on the technical side of interfacing the computers reliably with television sets. As a final note, the three ZX81's operating with 16K on monitors give good quality pictures, so the problem lies somewhere in the interface with home-based television sets.

Now its Apple versus Commodore.

Apple may have convincingly won Round 1, but the battle for the school computer market isn't over yet.

Eighty-nine per cent of New Zealand high schools now have an Apple computer, according to Mr Brian Eardley-Wilmot, sales manager of CED Distributors Ltd, the New Zealand Apple Distributor. Thirty per cent of schools own more than one Apple.

The revised offer to high schools of an Apple computer system for $2020 was accepted by 351 high schools.

Only 13 schools, that accepted the original offer of an Apple for $1200, couldn't raise the extra $820 dumping duty imposed by the Customs Department.

The dumping duty wasn't eventually claimed as CED Distributors added memory, the computer language Pascal and the teaching software Logo to the package and made a new offer at $2020.

This offer wasn't dumping as it was made by CED, a New Zealand company. Dumping involves an overseas supplier unfairly competing with a New Zealand manufacturer.

The Customs Department satisfied itself that the overseas company was selling to CED Distributors at the normal price and there was no evidence of a compensating payment.

Now CED is after the primary and intermediate school market.

It intends to offer at half price an Apple II, a monitor and one disk drive to every primary and intermediate school in the country.

And these schools won't have to make a quick decision—they will be able to take up the offer anytime over the next 12 months.

In the meantime CED will be holding computer awareness courses for teachers because, as Mr Eardley-Wilmot points out, unlike the high schools very few staff in primary schools are "computer literate".

He hopes that after the one-day awareness course the school will accept the Apple offer.

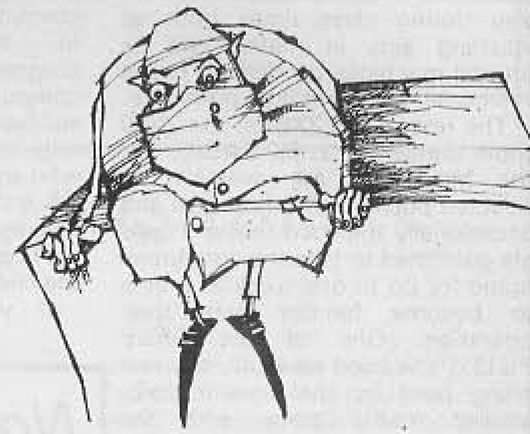
But another competitor has entered the fray. Commodore Computers have also made an offer to primary schools.

Commodore's "Grand Offer" package includes a VIC 20 computer, a cassette recorder and various cartridges and instruction books for $1000.

It will be interesting to see which computer primary schools opt for.

Computers can aid cure and care in medicine

by Alex A. Sergejew, of Carrington Hospital, Point Chevalier, Auckland 2.



The duty of the doctor has been stated as being "to cure occasionally, to relieve often, to comfort always". Computers can assist in the first two areas, allowing more time and resources for the more human aspects of medical care.

Medicine generally uses a problem-oriented approach: a patient's present complaints and past history are considered together with the findings of the physical examination (using the five senses). The resulting pattern is matched by the doctor to his past experience, forming a diagnosis, treatment plan, and an idea of the likely outcome. This process uses memory, pattern-recognition, and logical thinking tasks. The human brain is a relatively poor processor of information, and the computer can often be programmed to be at least as good.

In one study in Britain relating to the acutely painful abdomen, a microcomputer proved (retrospectively) more accurate and recommended 80 per cent fewer needless operations than the surgical team involved. Of course, the history and examination all had to be done carefully by the team, and it is difficult to see how and why computers should intrude here.

There has, however, been at least one study of computerised history-taking by computer, where the patients concerned rated the computer as being "more sympathetic" than their doctors.

Blood tests, X-rays and other special investigations all greatly add to the information acquired by the doctor's senses, and these technological sensory aids have long been incorporated into medical practice. It is in this area that computers have been most readily accepted. The C.T. scanner (computerised tomography) is a well-known example that has replaced some unpleasant or downright dangerous X-ray investigations. Computerised controllers are widely used in laboratories.

> Dr Sergejew is in residency training in psychiatry at Carrington Hospital Auckland.
>
> He has worked in the computer industry (for IBM and DEC), is an affiliate member of the N.Z. Computer Society, and a foundation executive member of the N.Z. Microcomputer Club.
>
> He has research interests in the uses of computers in medicine, particularly in the areas of the simulation of brain physiology, medical decision analysis, artificial intelligence and computer-assisted instruction. He has an Apple II personal computer which he uses for playing games, for doing some modelling work and statistical analysis (not necessarily in that order!).

IBM has begun marketing a portable electrocardiograph (ECG) machine with a built-in microprocessor that not only takes the ECG in the usual manner but also interprets it, often as well as a cardiologist.

Medical schools are already using computer-assisted instruction (CAI). Good teachers are scarce, and they can reach a wider audience through this medium which is cost-effective and available when the student is ready. Instruction could be based on actual patients being seen by the student (by tying-in with the patient's data-base) or simulated in the case of an illness for which there are no examples at the time. Computerised models of clinical decision-making are valuable teaching devices because they are perfectly consistent and their logic can be readily examined.

These wonderful aids will increase the accuracy of medical diagnosis and treatment, and help get more care per health dollar by way of increased efficiency and throughput — surely important considerations in the New Zealand scene. The aim is not to replace the doctor, but rather to complement his skills; "any doctor who can be replaced by a machine, deserves to be replaced". The person using computer data will always have to make the decisions involving the patient, and take the responsibility for these decisions.

The potential is good for medicine and good for society.

Computers have also been readily accepted into applications requiring extensive computation, such as radiotherapy planning, statistical surveys and electroencephalogram (EEG) analysis, or where prolonged vigilance is required, such as intensive care monitoring.

As superior information processors, computers are revolutionising hospital book-keeping systems, for example accounting, inventory, payrolls, dietary administration and even

System allows more personal service for patients

Cathy Arrow

Dr Len Brake, a general practitioner in St. Heliers, Auckland, has recently installed a Medical Manager system which runs on an Apple II computer, three disk drives, and a dotmatrics graphic printer.

Menzies Computer Services distributes the program, which was developed using General Manager, a hierarchical data base management program. The key to success was having Mr Robert Vallie, of Parnell, design Medical Manager working in consultation with Dr Brake.

Using the package General Manager enabled the program to be completed in four weeks, using two weeks of programmer's labour.

Security of files is ensured by the doctor's identifying code being the first entry necessary before information is put on screen.

Disk back-up is vital. Back-up copies are made and kept in a safe place.

A battery back-up unit ensures continued operation in the event of a power failure.

"A more personal service has been achieved," says Dr Brake. Often during morning coffee break, a patient's data is recalled on screen and a 'phone call made to check the patient's progress.

"The G.P.'s records are his most important tool of trade," says Dr Len Brake. "The power of instant recall of accurate data together with better utilisation of staff makes this type of system superior."

Dr Brake admits to starting out sceptical of a completely computerised system. He had investigated a large number of paper systems but was not keen on the volume of paper and amount of his time involved. Dr Brake had also used a mainframe billing system which proved to be expensive and had no instant access.

Dr Brake says he has no knowledge in the field. "To me it's a tool and a toy," he says.

Clearly, documented operation procedure was essential and played an important part in development of the program. The operations manual is therefore simply and clearly written and covers all aspects of operation. This, combined with training on both the Medical Manager and Word Processor, have made using the system easy.

The major hold-up in setting up was the transfer of records on to the system by Dr Brake. He was surprised that in some cases details such as patient's middle name or changed telephone number were not on his existing card system.

Dr Brake at this stage retains a card index stating the patient's name, which the patient brings through from the receptionist to him.

The doctor types in his code plus the family name and within 15 seconds has an overall medical profile. He spends approximately half an hour daily dictating information on to cassette for his staff to finalise.

Reaction from patients has been mainly enthusiastic, but some experience a slight initial fear or hesitation.

Dr Brake says, "The days of secrecy are gone; the patient is

Continued Page 26

From opposite page

menu design. Computerised resource-management (such as of surgical waiting lists and blood bank supplies) are increasing the cost-effectiveness of institutional medical care. The medical record itself poses great technical problems, but a lot of work is being done on this locally and overseas.

In the practico of medicine, therefore, the computer holds great promise as a memory aid, a sensory aid, and as an aid to information processing and thinking.

There are many exciting developments in the near future. We are already seeing the advent of electronic libraries, with "journals" being continously updated and being widely available for access over telephone lines by terminals in hospital, clinic or even home.

Medical information systems will come to incorporate clinical, social and economic data, with due regard for confidentiality. It will at last become possible to assess the efficacy of health care delivery, allowing better-informed administrative decisions regarding prevention as well as curing and caring.

Automated accounting systems, word-processing technology, and computerised patient data-bases and recall registers will help reduce the routine and time-consuming clerical work required of doctors, nurses, and other health-care professionals, giving them more time for looking after their patients.

Credit savings cover outlay

To run his practice with minimal staff is the aim of Dr Kenneth Orr, of Auckland, who had been using a computerised system for more than three years.

Dr Orr has had "better control of credit than I ever thought possible."

Specialising in physical and manipulative medicine, the practice has a great patient turnover.

Each patient entails a letter to the doctor on arrival, a letter for change in treatment, and discharge note. This means a dozen letters a day. In addition there are two or three Accident Compensation reports a week.

Dr Orr's nurse gave the utmost co-operation and approved of having a computer system. It took about a month to become used to it. She now has full command of word processing.

A dictaphone is used by Dr Orr, who works from the patient's card. Proofs are printed using an ordinary ribbon. When the roughs come through he may wish to change a few words. The final copy is done with carbon ribbon, using a Diablo daisy-wheel printer, which at $5,000 was not the cheapest, but has proved reliable and given excellent results. Spelling and punctuation errors do not show in the final copy. Every copy is an original and the correspondence looks good.

The doctor also uses the system to print out the weekly Health Department schedule, having received authority from the department to use its own copy of the form.

"Improved credit control alone had paid for the computer," says Dr Orr.

Accounts were previously sent out and while there were expectations of being paid on the 20th of the month, this didn't necessarily happen. Accounts are now sent out on the 1st of each month. They are correct, on time, with reports generated, stating which accounts are current, and which are one month or two months overdue. At a glance it can be seen which needs a phone call and the matter can be pursued immediately. The collection rate is phenomenally good.

Dr Orr wants to expand disk space. On the original installation he had 1000 records, which was an underestimate of the requirement, but he now has two sets of disks with 1000 records on each.

The computer is due to be replaced as the lease is up. Leasing has the advantage of providing a tax deduction, apart from not having to put up capital, though the last Budget reduced its attraction.

The doctor will purchase his machine for the residula 10 per cent when the lease is up and use it for work on his small farm.

Dr Orr is not interested in having clinical information on the computer. He feels his present card system is more efficient, cheaper, and is not subject to loss or ageing.

The problem of using the computer for clinical information is that extremely fast typing ability would be needed. Also, dependence on a machine to recall patient information could mean the loss of this information completely in the event of a mishap such as a power loss. Permanency of records is vital in Dr Orr's view; a medical practitioner often has to make reports months, or even years, later.

He has added Visicalc to his system for planning and forecasting.

"I don't say that I would choose the same system today, but I've been operating for more than three years, and there wasn't much choice," he says.

"The choices become bewildering. A good comparison of different type of machines needs to be set up."

"I started in cold, but had ham radio electronics experience," he says of his introduction to computers.

He was aware packages were available for a single unit with decent peripherals and sufficient disk capacity.

The medical debtors ledger package, written to Dr Orr's specifications by Southern Southern, is a suite of four major programs in BASIC with some high speed machine language routines.

This package is available for about $1,000. If supplied with the equipment then no charge is made for transferring it to a different machine or for customisation.

The only suitable General Ledger package available at that time was from Interactive Applications Ltd. This is used for day-to-day accounts.

It runs on a Commodore 2000 (early model), 3040 Disk and 2022 dot matrix printer, later replaced by the quieter and faster 2032, all worth $8000 three years ago.

The doctor is now setting up the Silicon Office package for $2,700. This consists of Word Processor, communications software, database system, compatible with Visicalc. It will probably take about 50 hours "to learn to drive."

— Cathy Arrow

SYMPTOMS

The Editors,

We are just beginning to learn about computers with the view to purchasing or leasing a microcomputer for use in the surgery. Initially, we may well employ something small which will help with accounting but will eventually need a microcomputer with approximately 8M byte storage for patient records.

We wonder if you can help us with any information regarding:

1. Magazines or any other N.Z. publication (we have bought several Australian magazines and books written there and in England.)

2. Courses available to the public (the nearer to us, the better, but we would be prepared to travel to Auckland).

3. Recommendations, cautions or tips about companies producing microcomputers here.

In fact any information which you think could be useful to us, we would gratefully receive!

Yours sincerely,
Angela Thornton for
Dr. E.K. Thornton, M.B.B.S.
P.O. Box 437, Opotoki.

DIAGNOSIS

To answer your questions in order:

1. This issue of "BITS & BYTES" is sure to be of value to you in your search. We plan to include further medical computing articles from time to time. The November, 1981, issue of "Microcomputing" included two articles on computerising medical offices, another on a hospital application of an Apple computer plus editors notes on the subject. During 1981 another 15 items of medical and dentistry applications appeared in "Interface Age," "Creative Computing", "Personal Computing" (American Magazines) and "Practical Computing" (Britain).

2. Technical Institutes run a variety of courses on computers. Many of these are aimed at a programming or technical audience, but you would be best to start with a computer appreciation style of course before progressing on to programming and business use of computers. Many secondary schools are now running adult evening courses on many aspects of microcomputers. Perhaps there is such a course in your district. We would like to publish details of such courses in future issues.

3. Information about a variety of microcomputers, their applications and problems, will of course be printed in "Bits and Bytes" as they come to hand.

We would be very interested to hear of your progress in this project from time to time, so that we can share them with our readers.

The editors.

N.Z. adapted package

Since the late seventies, the time that the first practical microcomputers were launched onto the market, there have been regular pronouncements that these new devices will revolutionise many aspects of society. In most cases, these statements have either been unfounded, or at best premature. Microcomputers certainly have the potential to change our lives but have not done so because of a lack of practical or relevant software.

This is the opinion expressed by Mr Pat Menzies, director of an Auckland-based microcomputer software distributor.

He says that the situation is rapidly changing. Over the last couple of years, a number of database management packages have come on the market. The sophistication of these packages and allied developmental tools has improved at a spectacular rate and some valuable and interesting applications are now being created.

Continued over

PROGRAM PUZZLE

Dear Sirs,

In your first issue you published aproblem sent in by Carol Miles that she had with numbers going "haywire" in what appears to be a simple program. I offer the following reply.

Carol,

The problem of your program going "haywire" is rather difficult to explain simply. To understand it you would need to follow the processes that the micro-processor uses to handle numbers. Put in basic principles, the problem stems from the fact that the micro-processor works with binary numbers, while we work mostly with decimal numbers. In some circumstances, the conversion process is not absolutely accurate, resulting in small errors as your results show.

There are various methods of dealing with such a problem, depending on what is required of a particular program. The usual method is to use the INT function and a round-up factor:

```
15 R = INT(R*100 plus 0.5)/100
```

If this line was added to your first program, unwanted errors would be suppressed. However, I would personally favour your solution as in your second program in this instance.

On trying your first program on my System 80, it ran perfectly without need for modification! But take heart Carol, by reducing the STEP value I was able to get similar errors.

Yours etc,
Colin Meynell
Christchurch

Dear Sirs,

In answer to your correspondent, Carol Miles's query as to what happened to her program, ("BITS & BYTES", September). The problem in the first program is because a build up in round-off error due to the fraction one-fifth (0.2) not being possible to represent exactly in binary (.0011, repeating, in binary).

No computer has infinite storage and the decimal is terminated after a finite number of figures. To demonstrate, take n = 12. Then one-fifth equals 0.001100110011 is the represented value in the computer and one-fifth plus one-fifth equals two-fifths (as we all know). Unfortunately the computer sees it as:

1/5 + 1/5 = 0.001100110011
+ 0.001100110011
0.011001100110
= 2/5 to 12 decimals

But when this is done some five times (1/5 1/5 1/5 1/5 = 1) the value recorded:

5 x (1/5) = 0.111111111111, which as you can see, does not equal 1.

What has happened in the first program is the error has at - 6.2 built up to being significant whereas before 6.2 the rounding to 8-digit decimal has "hidden" the effect. In the second program whole numbers, which can be exactly represented in the binary, are added, hence no round off errors occur in the adding. Those resulting from the division which, remember, is independent of the addition are insignificant and are "hidden" by rounding to the 8-digit decimal print out required.

An interesting program demonstrating this effect extremely well is: (BASIC (obviously)).

```
10 FOR I = 1 TO 1000
20 X = X + 1/ (1001-I)
30 Y = Y + 1/I
40 NEXT I
50 PRINT X, Y
```

Yours, etc
Robert Claridge,
Hokitika

From previous page

One such package is General Manager, a hierarchical database management system published by Sierra Online, Inc., of California and exclusively distributed in New Zealand by Menzies Computer Services. Although this package operates on the Apple II, it is capable of supporting up to 40 Megabytes of data files.

Mr Menzies had been asked to supply an application system for a local doctor and contracted programmer/analyst Rob Vallie to design and implement it. Mr Vallie had recently returned from Canada, where he had been working on an IBM installation using IMS. This product (one of the mainstream of large system database managers) and the General Manager are very similar in concept and capability, according to Mr Vallie.

Dr Len Brake, a general practitioner in the Auckland suburb of St. Heliers, and Mr Vallie began design meetings in early July. The data structure chosen allows for the application to be used in a multi-partner practice. The record system is accessed from a doctor identifier code which leads to a patient/family record. This provides further access to details of individual family member patients and from there to detailed consultation data which even includes laboratory test results where appropriate.

In addition, the system maintains records of fees charged and claims recoverable from the social welfare system (General Medical Subsidy, Accident Compensation, etc). This information is shared between the Fees/Claims record and the Debtors Ledger.

The data stored allows the doctor, (while the patient is entering the surgery) to review the patient's general record, refresh his memory on the detail of previous consultations and treatments as well as mundane matters such as unpaid accounts.

All this data is stored as one logical record with access allowed from a variety of screen layouts. In fact, each screen displays only a different view of the same data thus eliminating the otherwise crippling overhead of multi-file accessing. As Mr Vallie explains, a traditional file management system could not have done the job at all, being defeated at the outset by the need for variable-length records (patient history and consultation notes will vary immensely from one patient to another).

A number of standard reports have been defined within the system which is, in any case, fully integrated with a word processor allowing data to be drawn from the database and used freely in word processor output. This has particular attraction for a doctor continuing to carry out research and preparing to publish his notes.

One of the most important features of this type of development, says Mr Menzies, is the ease with which it can be tailored and modified. This means not only that slightly differing requirements can be catered for within the same general framework, but that should a users needs change, the database can be updated to accommodate those changes.

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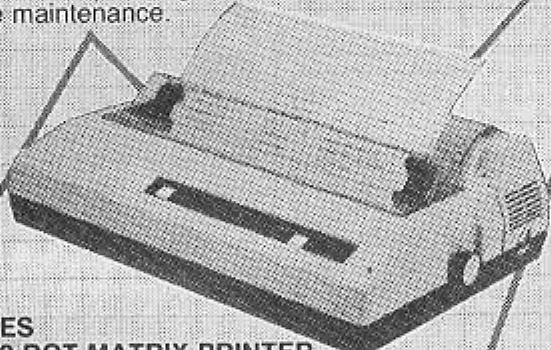

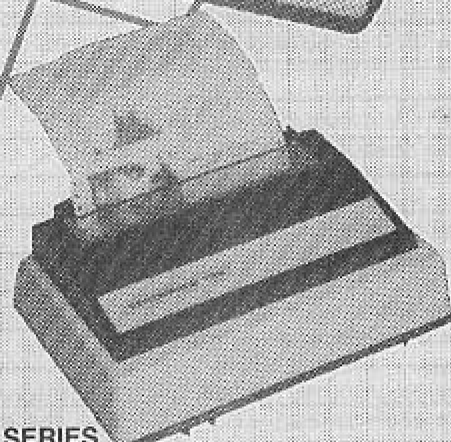

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IA3936

Shades and colours for GTIA chip

By DAVE BROWN

My co-writer, Mark, has been involved in some depth with machine language and his assembler-editor, working on some future articles, so this month's column has been left to me. I have decided to surface the little-documented GTIA chip.

You may have come across references to the GTIA chip. What is it?

The GTIA is the device in the Atari's hardwear that controls access to the available graphics modes. (GTIA is for Georges Television Interface Adapter). The older Atari's used a GTIA chip that allowed the user the choice of eight graphics modes, which included the three text modes (graphics 0, 1, and 2.

Graphics 0, 1, and 2 are classified as graphics modes because of the control codes that generate the special control symbols such as hearts. The first three modes can also use a redefined character set (more on this in a later article). "Space Invaders", from Taito, is an example of this.

The GTIA chip allows all of these modes plus another three, graphics 9, 10, and 11. These three modes are very useful for graphical representation and games. There are several ways to check whether you have the GTIA in your computer.

If you purchased the Atari in New Zealand or Australia, and it had two stickers on the front by the cartridge access panel (labelled G and PAL) then your computer has the GTIA chip fitted. Don't despair if your Atari didn't have the appropriate stickers on it, so long as you purchased it in either Australia or New Zealand you should have the GTIA chip.

The reason for this is that the Atari distributers in the United States used the Australasian market as a guinea pig for the new chip.

If you are still in doubt any one of the two sample programs will check it out.

Graphics 9, 10, 11

Graphics (GR) 9 allows you to have 16 shades or luminances of the same colour. GR 10 allows you all nine colours at different shades or luminances, and GR 11 allows 16 different colours at the same shade or luminance.

The dimensions of these graphics modes lies somewhere between graphics 4 or 5 and graphics 8. They all (i.e. GR9, 10, 11) have an X axis value of 0 to 79 and a Y value of 0 to So in effect they have the same X dimensions as graphics 4 or 5 and the same Y dimensions as graphics 8. Because this represents a ratio of slightly greater than three to one, on the Y axis, if you plot X, Y, then the result will be a rectangle having a width three times greater than its height. The result of a bar graph in these modes is similar in effect to stacking bricks, one on top of another.

If a modified display list were used to generate a single line of text (Graphics 0) at the bottom of the screen (GR 9, 10, 11 have no text window such as the other modes), the effect would be to create a bar graph, with a scale that would work out very easily. For example the X axis in graphics 9, 10, 11 is 0 to 79 or 80 and the X axis for graphics 0 is 0 to 39 or 40. It can be seen that graphics 9, 10, and 11 have double the X axis of graphics 0.

This means using single graphics 0 characters they will be positioned perfectly under every second column in graphics 9, 10 or 11.

Details:

Graphics 9

This mode generates 16 different shades of the same colour. The base colour is specified by SETCOLOR 4, the colour you want; 0 makes the background appear to be black unless you have the contrast and or brightness to high.

The command, COLOR 1, will give you the darkest shade which is the same as the background, while COLOR 16 will give a shade that is

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From Page 21

paying." He feels his records can be shared with the patient. "The patient can have a print-out of his medical history if he wants it."

Thanks to the screen writer the patient's employer even gets a better deal. "Instead of my brief handwritten note, he now receives an easy-to-read letter, detailing the type of illness," says Dr Brake.

Quick and accessible breakdown of information is a feature. Recalling certain patients on a certain pill, e.g. the contraceptive pill, means comparisons can be easily made or letters sent to all those patients. The clinical screen is used for laboratory results and outpatient data.

At present medical laboratory IBM computer printed reports are dispatched by courier. Dr Brake hopes that reports will eventually be directly fed from laboratory to doctor. He envisages the

System allows more personal service for patients

Cathy Arrow

laboratory computer will "call up" the doctor's computer and the report will be on disk awaiting the doctor's use.

Dr Brake is evidently delighted with the system, and enthusiastically looking forward to expanding.

As acupuncture now forms 25% of his practice, Dr Brake is anxious to begin taking down patient records rather than having to transfer them. He is very excited at the prospect of using Apple colour graphics for acupuncture location diagrams.

Incorporation of a patient appointment system is also planned.

almost white because of its brightness. Program 1 (printed with this article) uses graphics 9 to draw several three-dimensional cylinders or tubes. Try it out.

Graphics 10

This mode uses all of the Atari's nine colour registers. These hardware registers are

- SETCOLOR 0
- SETCOLOR 1
- SETCOLOR 2
- SETCOLOR 3
- SETCOLOR 4

and

- Player/missile 0
- Player/missile 1
- Player/missile 2
- Player/missile 3

If you use graphics 10 with BASIC SETCOLOR statements and COLOR 1 to 9 you will achieve only three colours for your effort. The way round this, to get all eight colours (yes, eight, the ninth colour is the background), is to POKE the colour registers with the colour you want before you use the COLOR statement.

For example, the Atari manual gives all the colours a number between 0 and 15. Take the value of your colour choice, multiply it by 16 then add the value of your luminance to it.

RED = 3 (from manual) times 6 plus luminance

So SETCOLOR 4, 3, 6 = POKE 712, 3 x 16 plus 6 or POKE 712, 54

The POKE statement will make the background red.

The following is a list of colour registers and the locations to POKE the colour information into.

Location to POKE	Register NAME	Equivalent BASIC NAME
704	COLPM0	Player/missile 0
705	COLPM 1	Player/missile 1
706	COLPM 2	Player/missile 2
707	COLPM 3	Player/missile 3
708	COLPF 0	SETCOLOR 0
709	COLPF 1	SETCOLOR 1
710	COLPF 2	SETCOLOR 2
711	COLPF 3	SETCOLOR 3
712	COLBK	SETCOLOR 4

As each register has its own colour and luminance so graphics 10 can have 8 different colours as well as different shades.

Graphics 11

This mode is exactly the opposite of GR 9, that is, you have all 16 colours but at the same luminance for each colour you use. The luminance or brightness for each of the sixteen colours is set by the following statement SETCOLOR 4, 0, (LUMINANCE).

The second of the two programs we have included draws a circle, fills it in and then rotates the colours to make it look like it is spinning.

All of the three GTIA modes (or 9, 10 and 11) have the same memory usage as GR8, that is about 8K (it is 7900 bytes).

If you encounter any major problems drop me a letter to P.O. Box 6053, Hamilton, addressed to "Problems Department", and I'll try my best to fix it for you. (Please enclose a stamp for return postage).

Good Computing!

Program 1

```
10 GRAPHICS 9
15 SETCOLOR 4,15,0
20 FOR Y=55 TO 0 STEP -10
25 FOR X=0 TO 24
30 C=X:IF X>11 THEN C=24-X
35 C=C+3
40 Z=Y+(X)
45 D=INT(SQR(144-(X-12)*(X-12)))/2
50 COLOR 15-C
55 PLOT Z,Y+7-D
60 DRAWTO Z,Y+7+D
65 COLOR C
70 DRAWTO Z,180-Y+D
75 NEXT X
80 NEXT Y
90 FOR T=0 TO 400
100 SETCOLOR 4,T,0
110 FOR Z=0 TO 50:NEXT Z
120 NEXT T
130 GOTO 10
```

Program 2

```
100 REM
115 DIM C(8):GRAPHICS 10:FOR Z=704 TO 71
2:READ R:R=R*16+8:C(Z-704)=R:POKE Z,R:NE
XT Z
116 DATA -.5,1,3,4,5,7,9,12,13
118 LIM=22:T2=3.14159*2/LIM:COL=3:E1=1:D
IM D(LIM,2)
120 GOSUB 1500:FOR V=1 TO LIM:T=T+T2:GOS
UB 1500:NEXT V
400 GOTO 1000
490 REG=705
500 FOR X=1 TO 8:POKE REG,C(X):REG=REG+1
:IF REG>712 THEN REG=705
510 NEXT X:REG=REG+1:IF REG>712 THEN REG
=705
520 POKE 77,0:GOTO 500
1000 REM
1005 FOR E=1 TO 10:E2=INT(E/2-0.5)
1010 FOR R=E1 TO E1+E2:CR=8-COL:IF CR=0
THEN CR=8
1015 V=0:COLOR CR:GOSUB 2000:PLOT X,Y
1020 FOR V=1 TO LIM:T=T+T2:GOSUB 2000:DR
AWTO X,Y:IF V>=LIM/2 THEN COLOR COL
1025 NEXT V:NEXT R:COL=COL+1:IF COL=9 TH
EN COL=1
1030 E1=E1+INT(E/2+0.5):NEXT E
1200 GOTO 490
1500 D(V,1)=SIN(T):D(V,2)=COS(T):RETURN
2000 X=(30-R)*0.6*D(V,1)+40:Y=60*D(V,2)+
80:RETURN
```

Fun sounds and

By B. M. BULLEN

While this article is written using a VIC-20 the same principles will apply to any micro, so even if you don't own a VIC (yet) read on.

Firstly a quick overview of the VIC's sound facilities. The VIC has four sound generators (voices) and a volume control. These are controlled by poking the relevant memory location with the desired frequency or volume. The first three voices give a pure musical note, the same as you would get from a tuning fork. The fourth gives "white noise" - as used in Space Invader type games to simiulate lasers, explosions, etc.

The numbers for your poke statements are:

VOICE	Memory locations	Allowable range of values
1st musical	36874	128-255
2nd musical	36875	128-255
3rd musical	36876	128-255
White noise	36877	128-255
Volume	36878	0-15

Using numbers above the allowable range for the voices gives an "illegal quantity" error; numbers below the range turn the voice off. It pays to stick to O as a standard "off" value. The volume can be set anywhere between 0 and 15 but only integer values are considered, i.e. 8.967 and 8 have the same effect.

A simple example:

10 POKE 36878, 15 (turns volume on full).

20 POKE 36876, 196 (sets frequency of second voice).

This will give a single note, approximately the note you get when you pick up your telephone. By altering the 196 value you can get exactly the right frequency.

Now we know this what can we do with it? Almost anything. A quick look in the VIC-20 personal guide (pages 136-138) shows how to do 20 different effects ranging from sirens to birds chirping, explosions to feet running. Making your own sound effects is simply a matter of knowing a few basic principles and then experimenting to get the effect you want. So let's look at the things you need to keep in mind.

Choosing the frequency

The starting point in any effect is getting the right note. This is a matter of listening to the sound you want and then trying different frequencies until you find the right one. This short program takes some of the effort out of changing frequencies.

```
10 INPUT "S, F"; S, F
20 POKE 36873+S, F
30 GOTO 10
```

When running this you just turn the volume on by entering 5, 10 then enter 1 - 4 for the voice you want and any number for the frequency and then experiment from there.

Changing the frequency

By lowering the frequency you can simulate the sound of something falling, or coming towards you. Try this.

```
10 POKE 36878, 15
20 FOR F= 255 TO 128 STEP -1
30 POKE 36876, F
40 FOR T= 1 TO 50: NEXT T
50 NEXT F
60 POKE 36878, 0: POKE 36876, 0
```

Experiment with the other voices, try changing the delay time in line 40 to make the effect runs lower or faster.

By raising the frequency you can simulate something coming towards you. Change line 20 to read:

```
20 FOR F= 128 TO 255
```

This effect can be used to simulate something coming towards you and then moving away. Try it for yourself, then compare with the program later in this article.

Alternating the frequency

Many effects are based on alternating between two frequencies. For instance my doorbell sounds like this.

```
10 POKE 36878, 15
30 POKE 36874, 250
40 FOR T= 1 to 100; NEXT T
50 POKE 36874, 210
60 FOR T = 1 to 100: NEXT T
```

By adding two lines that make the effect repeat you have the basis for a siren. Add these lines.

```
20 FOR R = 1 to 30
70 NEXT R
```

Changing the volume

The most common example of this would be the explosion.

```
10 POKE 36877, 220
20 FOR V = 15 TO 0 STEP -1
30 POKE 36878, V
40 FOR T = 1 TO 300: NEXT T
50 NEXT V
```

Here changing the volume from loud to nothing gives the effect of the explosion dying away. This change of volume effect is used in the VIC guide to simulate ocean waves. The ebb and flow of the waves is simulated by the decrease and increase of volume. Try using this method to create the effect of a ball bouncing down a set of stairs.

Effect of pauses

Sometimes a pure note is not quite what you want, but white noise won't give the desired effect either. These are the situations where you need to use pauses to modify a pure note. The most common case would be trying to get the effect of a bell or a buzzer. Try this:

```
10 POKE 36878, 15
40 FOR R = 1 TO 15
50 FOR P = 1 TO 5
60 POKE 36876, 210
70 FOR T = 1 TO 5: NEXT T
80 POKE 36876, 0
100 NEXT P 1
110 NEXT R
```

Here the pause is very small, simply the time it takes to execute the FOR loop. Insert a time delay as follows and note the effect.

```
90 FOR T = 1 TO 5
```

By varying the length of this delay you can alter the ringing sound. Try changing this and the frequency until you have the sound of a telephone. Now add these lines to give the double ring effect.

```
30 FOR X = 1 TO 2
120 FOR T = 1 TO 400: NEXT T
130 NEXT X
```

white noise

All we have to do now is keep this ringing for a while by adding;

```
20 FOR A = 1 TO 5
140 FOR T = 1 to 800: NEXT T
150 NEXT A
```

Have a look at the finished program and note again the effect of the pauses, both in modifying the pure tone and in giving the full effect of the telephone. Try altering the length of some of the time delays and note the effect.

These are the basics of sound effects. There are other fancy tricks but we'll leave them for the moment. Now is the time for you to start making your own effects. Don't forget that you can combine some or all of these ideas in the one effect. Study carefully the following program to see how many of the above principles have been combined (can you pick what sound it was I had in mind).

```
10 X = 1: Y = 15: Z = 1:F = 143
20 FOR A = 1 TO 2
30 FOR V = X TO Y STEP Z
40 POKE 36878, V
50 POKE 36877, F plus 32
60 POKE 36874, F
70 POKE 36875, F
80 FOR T = 1 TO 120: NEXT T
90 POKE 36877, 0
100 POKE 36875, 0
110 FOR T = 1 TO 40: NEXT T
120 F = F-Z
130 NEXT V
140 X = 15: Y = 1: Z = -1
150 NEXT A
160 POKE 36878, 0
```

Challenge: Can you simulate a sports-car accelerating away from you, complete with gear changes?

In my next article I hope to look further at sound, including how to run your sound effects without stopping your program.

From Page 12

while employees must be given information about their pay.

On the other hand, internal users make their requirements known to the people who process the data and the information they receive is used in the management and operation of the company. This internal information is produced if the company considers its value to be greater than the cost of producing it.

An analyst should be aware of these points as the end use of the information influences the way in which the system produces it. Usually, simplistic microcomputer systems produce outputs which are manually converted to the required format for external use.

It is essential to get a good understanding of what your client wants and the first step is to determine what happens in the existing system. This involves talking with those who do the job, reviewing any job manuals that may exist, and observing the operations at first hand.

Discussing the results of the findings with the persons responsible for (rather than doing) the job helps ensure that all versions of the functions are reconciled.

The outputs must show all data required by persons in the organisation and external (for example, creditors), so you must obtain a sample of each one.

each item of data on the reports. Two points about each item need to be noted - the maximum size and the type of data (numeric, how many decimal points, alphabetic). The ideal way to record these facts is to use a grid, such as that shown in figure one.

Across one side of the grid, record the data items, and on the other side, record the documents or files. Actually, one grid for output and one for files and input, makes the system more manageable. Now you can record for each of the documents and files the data items that are used on each.

The 80/20 rule says that 80 per cent of the time spent delving into the workings of the system will actually be taken up finding out what happens to 20 per cent of the data - the unusual happenings. Most systems spend 20 per cent of the time handling 80 per cent of the data and the remaining 80 per cent goes into the exceptions.

For the analyst, typical points to be followed up are:

- What happens at month end/year end - special reports and file updates?
- What reports have been produced in the past as special one-time reports for the boss?
- What happens when a piece of information (customer code or quantity) is omitted?
- How are addition or extension errors handled?

At all stages of the investigation, ask "why" everything is done and what can go wrong in the process.

One of the limitations of microcomputers arises when the capacity of storage devices is considered. While you can readily determine the normal volumes for input, data files, and output that can be expected, it is important to make the user fully aware of the capacity (maximum) that can be handled on your particular system. This is of importance when designing files and can become a point of contention if not clarified early.

The steps to be followed in determining what the user wants are:

1. Plan - determine what the objectives are, and define the problem.
2. Review the existing operating procedures: look at the manuals; observe the operations; talk with the personnel doing the job.
3. Record details of the present system:
   - Inputs - how much, how often, method of recording
   - Outputs - how often, what layout, who uses them.
   - Procedures - how does each step get done, what happens to problems.

Now you should have a talk with your client to ensure that you have a good understanding of the way things are done. Then you will be ready to design a new system.

Next month, I will outline the way in which you can design a small system.

N.Z. software exports: $20M a year

The arcane art of writing software is certainly alive and flourishing in New Zealand.

New Zealand has been called a nation of owner-operators. This coupled with the in-built drive to do-it-yourself has meant that quite a few software-writing organisations have been established since the arrival of the microcomputer on the scene.

Such companies do not have to be big to be successful. As in most other countries some of our best software comes from small dedicated teams, quite often set up as a cottage-industry type operation.

There is no overriding influence in this field, only a desire to produce the best software to do the job efficiently and quickly, at the right price.

A Government funded organisation exists to help innovative technology get off the ground. The Applied Technology Programme of the Development Finance Corporation provides funding, advice, and expertise to turn ideas for innovative products, such as software, into commercial reality.

In the area of export opportunity a number of incentives encourage software companies to earn much needed export revenue.

By far the greatest of these is the New Zealand dollar, as its value goes lower and lower so, too, does the cost of producing software in overseas terms. At present, the cost is considerably lower than in Australia.

This export is not without its dangers of course, as setting up an offshore operation is usually risky.

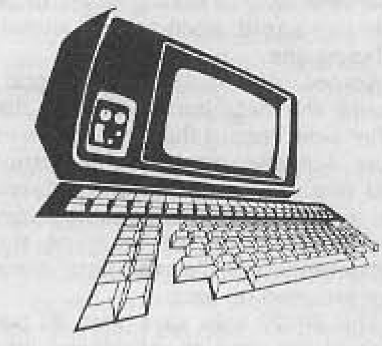
Many potential buyers will have nothing to do with a foreign company unless the essential software support service is available on the spot.

New Zealand's ability to compete on world software markets is firmly established, with at least three of our software companies at present having overseas offices and their products are competing well against the world's best, on their own ground.

The value of New Zealand software exports is running at more than $20 million a year, and given suitable encouragement—not just the sound of the falling dollar—this could reach $100 million in just a few years.

Let's look at some examples of New Zealand-produced software in three different areas of expertise: business, education, and agriculture.

We find that software written for a particular market area is not easily transportable from one country to another. Therefore much business software available from overseas would require considerable reworking to be acceptable for New Zealand business.



One typical difficulty is that the United States method of writing the date is not compatible with our day/month/year standard. Another more important difference is in the terms of credit given. New Zealand practice is to give credit until the twentieth of the following month, whereas many countries give 30 days from date of dispatch.

Many other differences, major and minor, exist. These, with the fact that not too many software packages can provide sufficient tailoring options to make them directly useful to New Zealand conditions means that much software must be written locally.

Typical of these is a suite of business programs written in a New Zealand-developed assembly level macro language which is generally transportable across all Z80 based microcomputers with only minor conversion. A 6809 version is under preparation.

Named BIZMAC, this two-address mnemonic language is the brain child of two Aucklanders, one a computer engineer and the other a public accountant.

They realised that most business houses using microcomputers will look for pre-written packages rather than doing the devleopment work themselves.

By developing this macro langauge they are able to provide commercial packages which are both faster in operation than interpreter-based language systems and are also quicker and easier to write.

Business programs consist mainly of accessing a major file, inputting current data, sorting, merging, and comparing data to produce reports, and updating the main files for the next run.

Programs written in BIZMAC are as efficient as possible in these areas, and yet are flexible enough to be easily customised to individual firm's requirements.

Application packages available now cover seven areas of business requirements, and special packages are available or are being written for specialised business applications such as a transport operator's package.

The BIZMAC monitor program costing $400, is required to run any of the packages.

It is also available to software houses and educational organisations as a development language system.

A compiler is also available.

The debtors system was bench-marked against a well-known BASIC version.

The first test involved processing and printing 21 statements and resulted in 9.5 minutes for BASIC and 4.5 minutes for BIZMAC. The other test involved only data movement and screen activity. This bench mark took 4 seconds in BIZMAC and 26 seconds in compiled BASIC.

This process consisted of zeroing 1000 storage locations, generating and storing 1000 numbers into the locations, reversing their order, transferring them to a new set of locations, zeroing the original locations, then transferring them back again. A full display on the screen was carried out after each operation.

Viewed as increased throughput on most microcomputers these timing differences make very big differences to processing times and the volume of work that can pass through an office.

To give some idea of the time required to write a commercial program in the language, the inventory system, which caters for all normal stock-handling transactions such as master file handling and stock reporting as would be required in a small company, was written in only three weeks by a programmer who was new to the language.

As well as producing state-of-the-art business software, New Zealand is also making great progress in producing educational programs and hardware.

The Polycorp Educational Computer System, Poly, is a New Zealand produced system that was originally developed at Wellington Polytechnic.

The main strength of the Poly system lies in its courseware. This is designed for simplicity of use, robustness, and through a combination of colour, diagrams and animation, it provides a valuable aid to the teacher which is stimulating, attractive, and educational for the pupils.

The range of courseware available covers several areas.

The first is computer awareness. Here learning activities are used to break down students fears of the technology, and to gain familiarisation with the kind of tasks computers do so well.

They also demonstrate the possibilities for social change that are brought about from computer technology and provide pupils with sufficient knowledge and skills, to evaluate social change and hence allow their realistic participation in determining which of the possible choice of futures society adopts.

Computer-awareness modules each cover one of the many useful functions possible on computers, such as encoding, storing, searching, listing, sorting, and updating data, text editing, word processing, stock control, and loan repayments, plus interactive demonstrations of services such as banking, decision making (i.e. choosing a career), setting up a private information data base, and a a traffic flow simulation where the student competes against the computer in controlling the traffic at a city intersection.

Other suites of programs include:

- Familiarisation Oriented Games.
- Keyboard Introduction, which teaches a physical skill through teacher-controlled drill exercises and provides an accuracy and speed assessment of each student.
- Physics—in one program, free-fall projectile motion is analysed and simulated using horizontal and vertical components.
- Geography—this enables detailed interactive studies of a particular area which highlights the importance of physical factors in the changing farming landscape.
- Farming Simulations—two of these are controlling orchard infestation of red mite, and dairy farm feed planning with several variables.

This the first article in a series by SELWYN ARROW on software in New Zealand.

How many colours in a rainbow?

By PIP FORER

In the last article we talked a little about graphics resolution. In this one we talk about colours. In spite of the title we are not simply reviewing the name DEC personal computer (one version of which rejoices in the brand name of Rainbow) but general issues in colour on microcomputers. Inevitably this also leads us back to facets of the definition of resolution. Just what do current systems offer for colour? Here are a few pointers.

They offer what your screen can display

The first point to note is that offering fine colour displays and delivering them are not the same thing. Whichever microcomputer you buy it is likely to deliver an image to you through a monitor. Many, for cheapness, use a domestic television. Most use fairly standard consumer video technology. This is becoming increasingly limiting but was initially no problem. With the first colour micros available, for instance, domestic television technology used for display was well ahead of what the machines themselves could generate. But there are limits to what you can show with such a screen, no matter what your computer is doing. Hitch a $500,000 Evans and Sutherland graphics systems with 3000 by 3000 dots resolution up to a domestic televison and (if you get anything at all) you would get graphics resolution that is little different from the 300 by 300 pixels of micro "high-resolution" graphics. Better colour, more choices perhaps but still much the same number of pixels and the same quality.

Quite simply the circuitry and the number of phosphor locations on low-cost monitors will support only so many pixels. Your newest microcomputer may know the difference between lighting pixel 550 and 551 on the X axis but your eye probably will not: the display capabilities are too coarse. Microcomputer graphics capabilities are rapidly outstripping conventional, low-cost display technology.

The screen can also govern the quality of pictures in other ways if the micro is attached to domestic televisions. The two major microcomputer-producing nations (the United States and Japan) use NTSC standard television equipment. We, along with parts of Europe, use a different colour standard, PAL. As Apple users will know there are problems with translating colour from one system to another. The Apple requires a different board added to it for PAL colour. Machines such as the Atari cope by producing a PAL specific version of their machine with similar circuitry already built in.

In the past some of the conversion units available for translating from NTSC to PAL were not all that might be desired. In addition machines which use domestic receivers through the aerial socket have to modulate their signals to approximate the usual broadcast television signal. This process is not expensive and is usually quite satisfactory but certainly never enhances the signal. In brief the monitor you use represents an upper limit on the colour clarity and choice that any microcomputer attached to it can achieve.

Colour machines offer less than at first appears

The nature of advertising material is to try to catch the eye. Thus it is that most microcomputers make much of the number of colours that they can portray. One may claim "over 256 colours may be displayed on the screen", another "16 simultaneous colours" and a third "six-colour graphics on the high resolution screen". These claims often reveal themselves as exaggeration or rather a simplification of the case. The 16-colour example may reveal itself (as it did for some overseas advertising for the VIC) to mean that there are eight colours you can use for a screen border and eight on the main part of the screen. The 256 colours sounds very good until you read that at the highest resolution only one of these can be displayed at a given time. The six colours may sound fine until you realise that some colours are available only on certain horizontal locations.

Colour graphics on microcomputers depends on a fairly simple idea: that of memory mapping. Essentially, each dot on the screen is linked to the values in a particular part of the computer memory. (There are other ways of handling graphics but these are not used by microcomputers.) In black and white graphics you can have 1 bit per pixel. If the bit is 0 the pixel is

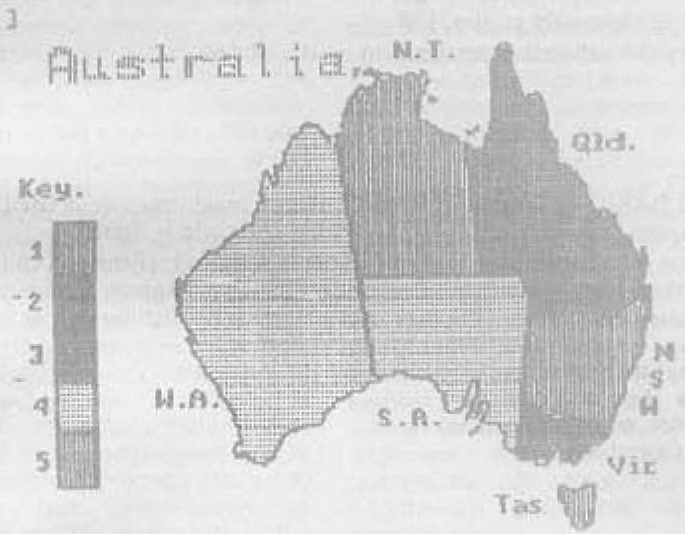
Continued opposite

From opposite page

black and if it is 1 then the pixel is lit (white). The memory mapping for colour uses extra bits per pixel. If it uses two bits then the pixel can have up to four values (0,1,2,3) equating to four colours. This means four pixels can be coded per byte. If you offer 256 colours simultaneously you must use an entire byte per pixel.

If you do a quick sum you realise that the sort of common high-resolution figures (200 x 200 +) require the support of somewhere around 50-60,000 pixels. At 1 bit per pixel that amounts to roughly 6-8K of RAM. At 2 bits it is 16 k and to support a whole 256 simultaneous colours is just about filling most 8-bit microcomputers with screen display and nothing else. The trade-off is quite straightforward. If you want a lot of simultaneous colours you need lots of memory.

How then is it that most machines offer some very interesting colour displays but use, as the Apple does, less than 8K for these? The answer is that there are a lot of unseen compromises in there to trap the unwary. The most common of these is the trick of making colour resolution occur at a lower resolution than the pixels.



We have already mentioned this with character graphics. Here fine displays are made up of graphics characters set in a coarser screen matrix. In any one cell of this matrix only two colours can appear (the background and foreground ones). However, many colours are available they can only appear together in certain rather coarse ways.

The same thing is done with some vector plotting machines. For instance both the Poly and the Apple code colour in horizontal clusters of pixels. In the Apple this is a 7-pixel bunching. Within that bunch only certain colours are possible. In Apple these are either the low or high bit colours (0 to 3 or 4 to 7). Plotting a coloured pixel into a 7-pixel unit can immediately influence all the other points colours. For instance if five points were plotted in colours 5 or 6 and the next point was plotted in colour 1 or 2 then all the other points in that unit would be flipped into colour 1 or 2. On its separate screens the same phenomenon occurs on the Poly. I tend to call this byte-flipping as one relates to the way that all the pixels coded in one byte of mapped memory are linked to each other and can be flipped by a single new pixel being plotted. The problem with this practice is that colours interact: you can get some odd results unintentionally.

Any detailed examination of graphics systems usually yields other operating characteristics that detract from the ideal situation but help get more colour out of less memory. The Apple again for instance does remarkable things with 8k by using as its colours ones which are complementary to form white. Thus on the Apple the colour, white, does not need to be coded but results from turning on adjacent pixels of complementary colours (say blue and orange, which are complementary, to form white).

What you usually end up with is a situation of less concurrently displayable colours than is advertised at a true resolution that is somewhat less than the actual number of pixels. In machines such as the BBC or Atari 400/800 computer where the pixels are independent you end up with 20k out of your RAM for each screen at the highest resolution. Usually on cheap systems the colours available to any one pixel are related and conditions by those used by its neighbours. Yet another twist on defining real resolution! Perversely this aspect is almost never mentioned in reviews of computing equipment.

Continued on page 35

SCHOOL COMPETITION

Entries are now open for the first "BITS & BYTES" school program competition. These will be run regularly with prizes of books for the monthly winners and certificates. For the grand, yearly over-all winner there will be a home computer.

Competition No.1 is for a game with minimum graphics, or none. The task is to supply a program that will generate a game one or more persons can play at a keyboard. It can be any game but it must be ORIGINAL!

Important!

This competition is open only to members of families which subscribe to "BITS & BYTES" or of families which have bought a copy of the October issue from a shop. You must:

- Enclose the number from the bottom of the address label of your copy (if you have lost it send us in details of the subscriber's name and address; we'll check it against our files); OR
- Send in the special entry card enclosed in shop-sold copies; OR
- If you are a new subscriber, accompany the subscriber application card and fee.

Conditions

1. The subject must be as outlined above.
2. The program must be either entirely in BASIC or largely in BASIC. If any machine code is used, it must be well documented so that it is quickly evident to the judges what the code is doing.
3. A print-out containing a listing and a run on a continuous piece of paper is required. If the run can be performed adequately only on screen, then supply a written description of what happens in the run. (Note: If you don't have access to a printer try contacting one of the micro clubs listed in "BITS & BYTES" for help. As a last resort send us a tape, at your own risk.)
4. The entrant must send with the print-out a sheet of paper containing the entrant's:
   - Full name • Address • School • Age • Form
   - Name of program • Machine it's for • Memory it takes
   - Subscription number or entry card (see above)

Deadline for entries

Entries for this first competition must be received by "BITS & BYTES" by **Friday, November 5.** Results will be published in the December issue of "BITS & BYTES".

Please send entries, the sooner the better, to:

Competition No.1
"BITS & BYTES"
Box 827
Christchurch

What the judges will be looking for:

The outside judge and one from "BITS & BYTES" will select finalists largely from print-outs and the final group will be given runs. However, depending on time and number of entries it may be possible to run all entries. Therefore the judges will take strong account of comprehensibility of programs. Ease of understanding may well be more important than speed and elegance. Use plenty of REM statements, make it tidy, and structured. The judges will be looking at it just as you look at a program in a book.

GET THAT ENTRY IN AS SOON AS POSSIBLE: More competitions next month!

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They offer more than at first appears

All is not bad, however. The writers of advertising copy have to hit you with the high priority messages . . . .like colours and resolution. While gilding the lily in this area they often omit various sophistications you can practise yourself or that are built into the operating system of their machines.

The ingenious colour compromises that different systems offer represent different ways of seeking maximum apparent colour range at minimum RAM cost. The advertisements often understate, what with added ingenuity, the user can do himself. One example of this is that the multiple-screen capabilities of microcomputers have taken some time to sink in. For a while it was not generally appreciated what an Apple could do with two high resolution screens plus text/low resolution. The Poly with its several multiple screens on which overlays can be achieved is another under-sold attribute. So, too, is the ability on any machine to move portions of memory around to get the fast presentation of additional images to the one in the standard screen memory area. With a bit of cunning you can get some good effects here.

Even more underplayed is the ability to create additional tones to the ones offered by the standard software choices, You can in fact create tens or hundreds of colours from a machine which offers only four or six. How is this done? Simply in the same way that your television creates a rainbow of colours in the first place from just three phosphor colours. The television combines these into groups with a certain balance of the primary colours turned on or off.

Thus a pure red area is pure red but if a few blue dots are also "on" then a mauve tinge emerges. A few more green dots "on" changes the colour again. By combining dots at a certain mix the television, by using suitably small dots, encourages the eye to believe that there is an area of similar colour, not a mosaic of dots in only three colours. The smaller the dots the finer the area for which a mixed colour effect can be achieved.

The computer can do the same trick. Its main handicap is that its initial pixel dots are larger (since they themselves may be composed of already bundled screen primary colours). Naturally you also need special software to mix the colours for you . . .but it can be done. In this way certain dot patterns can be combined on the Apple to give numerous colour effects. The cost is that the resolution **for a particular colour pattern** is considerably reduced.

The Poly can use its multiple screens in the same way to give the appearance of various colours. So it is that suitably located red dots on one screen are superimposed on suitably located blue dots on another to get a colour mix. When combined with the background screen colour that is available a wide variety of effects can be produced.

To do this, however, you do need resolution up about the 250 by 200 mark. The Atari, which in many other ways is a superior graphics machine, falls down on this since its highest resolution mode, which would be most suitable for this technique, offers only one colour (admittedly at two levels of brightness) and this is just insufficient.

So you can often get, after a fashion, more colours than advertised although these are not available for fine detail or through the built-in languages. All the memory compromises, however, also have a hidden disadvantage for certain graphics applications: we shall call this the confused mapping problem.

They offer confused mapping

Geographers are particularly demanding users of colour graphics. One thing they like to be able to do is quiz the screen to find out what colour is on at a particular point. In quite a lot of games applications this can also be quite useful. Now on some machines you can do that unambiguously. At low resolution many offer a SCRN style command that returns to the user the colour of any particular pixel at point (X, Y). However, some of the cramming techniques used by machines complicate any attempts to do this.

Let us take an example. If you draw a map on a computer with land uses coded to particular colour you might want to find the land use at a given point by checking the colour there. If you have a pure mapping of pixels to RAM where no colour interaction occurs you can simply have a short routine which looks at the relevant part of RAM and translates the value there into the colour it will give on the screen. However, you can be caught out if you try this with some of the crammed screen arrangements. With the Apple for instance a particular pixel location (X,Y) can only be on for two colours (a high and low bit one) or be part of a white pixel. The result is that the map we draw can not use certain locations for certain colours and, even if a pixel is lit in a particular colour, you are not sure whether it is a colour pixel or half of a white pixel. Byte flipping of colours can be another complicating factor here.

In addition, some obtain certain colours by shifting the dots on the television half a dot left or right from the position used by the standard colours. What this amounts to is that you can get acceptable images for viewing but you are limited in how much you can go to the RAM to see just what parts of the screen mean and this can be important in certain demanding uses.

The final unsung colour characteristic of certain microcomputer graphics systems is that some offer different and more flexible ways of handling colour. The more recent graphics machines have some good extra features built in. Some of these will be covered more fully in a coming article on software provision for graphics.

Continued over

book reviews

Don't, or How To Care for your Computer. Rodney Zaks, Sybex Inc., 217 pages. Price in New Zealand $23.95. Reviewed by Pip Forer

One of the great gulfs that cheap microcomputers crossed (compared to their heavier mainframe forebears) was when they broke with the cocooned environment. The robustness of LSI technology meant no more air-conditioned rooms, no need to stay in one place, no need for a troupe of handmaidens ministering to the environmental needs of the machine. Without this robustness no amount of price-reduction would have popularised microcomputing applications. As it is the microcomputer, like a Victorian lady free of her whalebone corset, can cavort into the most unlikely places and be used in the most unlikely way. Small, uncustomised machines like Apples and Acorn Atoms are seen tossing on the deck of expedition ships linked up to batteries or carted around horticultural sites in wheelbarrows. Surely, one might surmise, no one, however verbose, could justifiably write 218 pages on microcomputer care. A few gruff comments indicating the need to neither incinerate or submerge your machine while connected to the mains should suffice.

Not so. When the microcomputer liberated itself from the ministrations of professional care it did not get entirely away from the need for care **of some sort.** Rather it has come to rely on the sensitivity and common sense of its owner. Since many schools and individuals are acquiring their first microcomputer perhaps Rodney Zaks's book can fill a pressing need in reminding them of this dependency.

The overall judgment on this book must be that it is a boon for any first-time owner of a computer configuration. It may also be well worthwhile purchasing or browsing if you are contemplating getting your first microcomputer. It does spread itself rather in getting its message across, and the 218 pages are extended by a wide use of diagrams, but its message is well timed and well expressed.

A lot of what is in here is obvious, particularly to the initiate. Spelling it out does no harm though, and there are frequent useful tips that are clearly the outcome of a wide experience with microcomputers. Many of the

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GRAPHICS

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These include the ability to fill areas of a screen with colour and to scroll a graphics screen gently. Here just two other features are mentioned. One is that some machines offer both a colour choice and a luminescence choice. The luminescence option, which is most widely associated with the Atari 400 and 800 machines, allows a colour to be displayed in up to eight levels of brightness. This adds a certain amount to the things you can do with graphics, particularly imitating shading and shadow effects successfully on simple objects.

Perhaps more exciting is the ability to indirectly address colours. The BBC machine and the Atari both display this ability. What this technique means is that the computer adds an extra stage between getting a colour code for a pixel from RAM and displaying it on the screen. In early systems you might choose a colour three which might be red. Three was *always* red. In indirect colour assignment the computer in effect goes first to an index to see what colour three represents . . . . and the user can set this index. So three can be any of the machine's available colours. This has two benefits.

First, it makes it easy to administer a large palette (choice of colours and luminescences) with a limited choice at a particular resolution level. You may still get only four colours but they are now ANY four from, say, 16.

The other great benefit is that you can change these colour registers at any time. The speed of this is such that this means that in one refresh of the screen you can completely alter your picture. Firstly you can sudddenly alter all the occurences of any colour on the screen, all blacks to blues (the sky lightens in a picture). This can be dramatic. Equally you can "hide" outlines by having two colour registers the same.

This means that any object drawn in one of the these colours on the background of the other will be invisible . . . . although their pixels will be coded differently in RAM. When you want to shoot the surprise out of people you just change one of the colour registers and the pattern appears like a genii from a pantomime trapdoor. Really a very useful feature in both education and other applications.

What I hope all this suggests is that graphics colour capabilities of any system are not easily assessed just from advertising or even from abbreviated specifications. They may not even appear in magazine reviews. I was on to reading the seventh review of the Apple III before I got any feel for what colour graphics that machine can achieve, for instance. You really need to see a machine working.

The cheap Sinclair Spectrum computer has colour . . . but reportedly not a very good quality image. Other machines benefit greatly from having dedicated or expensive monitors. However, there are still questions about what the basic machine can do and how quickly it can do it. For that you need a protracted, hands-on experience or at least a weekend with system manuals.

A lot more of microcomputer graphics boils down to what the built-in software offers and what other graphics software is available. These issues will be explored further over the following months.

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sections would be useful wallboard material to educate other users on what is wise and why, particularly with floppy disks.

The book is organised in chapters dealing with particular aspects of the computer . . . . and this is computer writ broad. Therefore, we find sections on care of documentation, software, security and the computer room alongside the computer proper (about 15 per cent of the book) and peripherals such as floppy disks, tapes, hard disks, and the printer. Each section is augmented by a brief summary of main DOs and DON'Ts along with tips for care, explanation of good practices and many anecdotes on malpractice (. . . here's another horror story folks, as Zaks is prone to remark with apparent relish).

Now, as already said, some of this is obvious material. However, there is also a lot of nice extra information. The hard disk section is very good here for those of us (all of us?) without hard disk yet attached to our micros but who dream and plan and want to know what to expect. There is a good section on the need for stable power supplies (and the penalties of fluctuations). West Coast readers among others beware. Even where the material is very clearly stating the obvious. It does so with clear reasoning that may be very useful to a new user . . . or to anyone involved with explaining computer equipment to new users.

I would imagine for a start that every school should have a copy of this book, or one similar, as a resource. It will probably make a lot of things a lot easier: not because its material is brilliant or new but because it is readable and in one place. It is also a useful book for the home hobbyist or small-business user. There are other books which touch on issues of maintenance: the strengths of this one recommend it to the newcomer in particular. It is easy on the technological side, gentle in its treatment of hardware issues and pitched perfectly for the inexperienced reader. I would be dishonest not to admit that it may also be disturbing reading for one or two cavalier souls who think they are past such concerns as microcomputer care.

I began reading this book with the idea that I might propose a competition to precis its contents onto a single A4 sheet. That was an unworthy thought (although three sheets of foolscap might do for a micro-buff). I end by recommending it as a good source for encouraging careful treatment of hardware and as a pleasant way of discovering a little more about hardware. There is only one major omission that needs correction and it is truly major. There is nothing in the section on the computer room that deals with health and good layout design. There are some very useful guidelines on desk heights, posture, VDU positioning and so on available. If anyone is using the machines protractedly these issues are not minor concerns. As the book stands you may be encouraged to produce a computer environment that is ideal for silicon but inappropriate for people. You could end up with a different sort of disk problem than you anticipated.

INVENTORY MANAGEMENT FOR SMALL COMPUTERS, by Chuch Atkinson, dilithium Press, 11000 S. W. 11th Street, Beaverton, Oregon 97005, 1982, 194pp. Paperback $5.95. Reviewed by JOHN VARGO, lecturer in accountancy, University of Canterbury.

In many retail businesses inventory is the single largest asset. The purchase, storage, and sale of this asset is the primary function of the business. In spite of the obvious necessity for control of inventories, businesses find this task difficult because of the volume of transactions involved in trading. Manual systems using card files are inexpensive, but they are also time consuming and error prone, making reports cumbersome to prepare.

This book describes, in detail, an inventory-management system designed and programmed by the author. The programs, which are written in CBASIC and running under the CP/M operating system, have been used successfully in a number of businesses in the last couple of years. Minimum hardware requirements include 32K RAM and two disk drives, disk capacity dependent on the size of the inventory. Detailed instructions on running the system, together with complete listings of all the programs (object code), are included in this very useful volume.

The programs are menu driven, making them easy to use and have many user friendly features including free format date input and automatic return to menu. Major features of the inventory management system are:

- Inventory files by part number, description, or location in the store.
- Automatic purchase order preparation.
- Quick register program to allow a terminal to be used as a sales register providing automatic invoice preparation, and perpetual inventory updating.
- Sales analysis by product number each day, month and year to date, including computation of inventory turnover ratios and projection of sales for remainder of year based on current trend.

Included in Atkinson's book are numerous helpful suggestions. Information on backup procedures, determining disk storage requirements, and parts storage layout add to the comprehensiveness of the book. Because the object code in CBASIC is included, the programs may be modified to the reader's specific needs. A separate chapter on how to modify the programs is also included.

"Inventory Management for Small Computers" is a clearly written book. The programs can be followed easily due to the use of many REM (explanatory statements that play no active part in the program) statements. Programs are also available from the publisher in the disk size and format of your choice for approximately $US250.

This inexpensive paperback volume provides a good introduction to inventory management for a retail business, as well as a practical computerized solution to many of the problems presented in controlling this asset in a competitive environment.

An ABC of computer complexities

A

Applications program: A program written to carry out a specific job, for example an accounting or word processing program.

B

BASIC: An acronym for "Basic All-purpose Symbolic Instruction Code." The most widely-used, and easiest to learn, high level programming language (that is a language with English-like instructions) for microcomputers.

Binary: The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.

Bit: Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.

Boot: To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: An error in a program, which means the computer doesn't do what you wanted it to do when you wrote the program.

Byte: Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

C

Character: Letters, numbers, symbols and punctuation marks each of which has a specific meaning in programming languages.

Chip: Common term for an integrated circuit etched on a tiny piece of silicon. A number of integrated circuits are used in computers.

Computer language: Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer. See also Programming languages and Machine language.

Courseware: Name for computer programs used in teaching applications.

CP/M: A disk operating system available for microcomputers using a particular microprocessor (that is the 8080 and Z80 based microcomputers such as the TRS 80 and System 80). See also Disk Operating Systems.

Cursor: Not somebody who curses a computer but a dot on a video that indicates where the next character will be shown.

D

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or Floppy disk, is a single 8 inch or 5¼ inch disk of flexible plastic enclosed in an envelope. A hard disk is actually an assembly of several discs of hard plastic material, mounted one above another on the same spindle. The Hard disk holds much more information - up to hundreds of millions of bytes - while floppy disks typically hold between 140,000 and three million bytes.

Disk drive: The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

Diskette: Another name for a 5¼ inch floppy disk.

Disk Operating System: A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

DOS: See Disk Operating System.

Dump: Popular term for sending data from a computer to a mass storage device such as disks or tape.

E

Execute: A command that tells a computer to carry out a user's instructions or program.

F

File: A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.

Firmware: Programs fixed in a computer's ROM (Read Only Memory); as compared to software, programs held outside the computer.

Floppy disks: See Disks

H

Hard disks: See Disks.

Hardware: The computer itself and peripheral machines for storing, reading in and printing out information. The parts of the computer which you can kick.

High-level Language: Any English-like language, such as BASIC, that provides easier use for untrained programmers. There are now many such languages and dialects of the same language (for example MicroBASIC, PolyBASIC etc).

I

Input: Any kind of information that one enters into a computer.

Input device: Any machine that enters information into a computer. Usually done through a typewriter like keyboard.

Interactive: Refers to the "conversation" or communication between a computer and the operator.

Continued opposite

An ABC of computer complexities

Interface: Any hardware/software system that links a microcomputer and any other device.
I/O: Acronym for "input/output".

K

K: Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).
Kilobyte: See K.

M

Modem: Acronym for "modulator-demodulator." An instrument that connects a microcomputer to a telephone and allows it to communicate with another computer over the telephone lines.
Machine language: The binary code language that a computer can directly "understand".
Mass storage: A place in which large amounts of information are stored, such as a cassette tape or floppy disk.
MB: Represents a million bytes.
Megabyte: See MB
Memory: The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory. There is internal memory, inside the microcomputer itself, and external memory stored on a peripheral device such as disks or tape.
Memory capacity: Amount of available storage space, in Kbytes.

Menu: A list of options within a program that allows the operator to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one. Menus allow user to easily and quickly set into programs without knowing any technical methods.
Microcomputer: A small computer based on a microprocessor.
Microprocessor: The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

N

Network: An interconnected group of computers or terminals linked together for specific communications.

O

Output: The information a computer displays, prints or transmits after it has processed the input. See Input and I/O.

P

Pascal. A high-level language that may eventually rival BASIC in popularity.
PEEK: A command that examines a specific memory location and gives the operator the value there.
Peripherals: Any external input or output device that communicates with a microcomputer, for example disk drives.
Personal computer: A small computer for one's own use, whether in the home, school or business.
POKE: A command that inserts a value into a specific memory location.
PolyBASIC: The version of BASIC that runs on the Poly computer.
Printer: Device that prints out informations onto paper.
Program: A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.

R

RAM: Acronym for "random access memory".. Any memory into which you "read" or call up data, or "write" or enter information and instructions. Any memory in which an operator can gain direct access to any memory location at any time.
ROM: Acronym for "read only memory". Any memory in which information or instructions have been permanently fixed. ROM cannot be changed except under highly unusual conditions.

S

Simulation: Creation of a mathematical model on computers that reflects a realistic system.
Software: Any programs used to operate a computer.
Storage: See Mass storage.
System: A collection of hardware and software where the whole is greater than the sum of the parts.

T

Tape: Cassette tape used for the storage of information and instructions (not music).

V

VDU: Acronym for "visual display unit". A device that shows computer output on a television screen.

W

Word: A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

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For sale CT1 660 with 3K RAM, 1K BASIC, and tapes. $200 or nearest offer. Phone Carol (Auckland) (09) 45-0112 (W).

EMPLOYMENT REQUIRED in Christchurch by Stage 2 Canterbury University Student (Physics, Maths, Computer Science) during holidays. Phone: D. Rowe, 34-690.

For Sale: OSI Challenger 1P, 12" Green Phosphour monitor and tape recorder. Technical manuals assorted data, various programs on cassettes. $850 ono. Contact Brent Challis, 7 Stoke Place, Palmerston North. Phone: 68-788.

MICRO CLUB CONTACTS

CMUG (Combined Microcomputer Users Group): c/- P.O. Box 6210, Auckland, Selwyn Arrow Phone (09) 491-012 (h), or Brian Anderson (09) 275-5598 (h). All club enquiries welcome.

The following 12 User Groups are part of the N.Z. MICROCOMPUTER CLUB Inc, P.O. Box 6210, Auckland.

APPLE Users Group: Bruce Given, 12 Irirangi Rd., One Tree Hill, Phone (09) 667-720 (h).

ATARI Microcomputer Users Group: Brian or Dean Yakas, Phone (09) 8363-060 (h).

COMMODORE Users Group: Doug Miller, 18 Weldene Ave, Glenfield, Phone (09) 444-9617 (h), 497-081 (w).

CP/M Users Group: John Lamb, 11 Martin Ave, Remuera, AK5, Phone (09) 546-192 (h), 771-729 (w).

DREAM 6800 users: Peter Whelan, 22 Kelston St, New Lynn, Auckland, Phone (09) 875-110 (h).

DGZ80 users: Nigel Kai Fong (09) 502-013 (h), 89 Wheturangi Rd, Green Lane.

KIM users: John Hirst, 1A Northboro Rd, Takapuna, phone (09) 497-852 (h).

LNW users: Ray James, phone (09) 30-839 (w), 585-587 (h).

SORCERER Users Group (NZ): Selwyn Arrow, phone (09) 491-012 (h).

ZX80/81 users: Doug Farmer phone (09) 567-598 (h).

1802 Users Group: Brian Conquer, phone (09) 655-984 (h).

2650 Users Group: Trevor Sheffield, phone (09) 676-591 (h).

All the above contacts can usually be found at N.Z. MICRO CLUB meetings, or via our postal address (see above).

Other Club and Group details from around New Zealand.

SYMPOOL (NZ SYM User Group): J. Robertson, P.O. Box 580, Manurewa, Phone (09) 266-2188 (h).

ACES (Auckland Computer Education Society): Ray Clarke, 1 Dundas Pl, Henderson, Auckland, Phone (09) 836-9734 (h).

OSI USERS GROUP (AK) Vince Martin-Smith, 44 Murdoch Rd, Grey Lynn, Auckland.

NZ TRS 80 USERS GROUP (AUCKLAND): Olaf Skarsholt, 203a Godley Rd. Titirangi, Phone (09) 817-8698 (h).

ATARI 400/800 USER CLUB: Dave Brown, P.O. Box 6053, Hamilton, Phone (071) 54-692 (h).

ELECTRIC APPLE USER GROUP: Noel Bridgeman, P.O. Box 3105, Fitzroy, New Plymouth. Phone: 720-432 (h).

GISBORNE MICRO COMPUTER GROUP: Ron Taylor, 17 Byron St., Gisborne. Phone: (079) 81-450 (h).

TARANAKI MICROCOMPUTER SOCIETY: P.O. Box 7003, Bell Block, New Plymouth: Francis Slater, Phone (067) 84-514.

MOTOROLA USER GROUP: Harry Wiggins, (ZL2BFR), P.O. Box 1718, Palmerston North, Phone (063) 82-527 (h).

OSBORNE USER GROUP: Dr Jim Baltaxe, 18 Matipo St, Palmerston North, Phone (063) 64-411.

HAWKES BAY MICROCOMPUTER USERS GROUP: Bob Brady, Pirimai Pharmacy, Pirimai Plaza, Napier, Phone (070) 439-016.

WELLINGTON MICROCOMPUTING SOCIETY Inc. P.O. Box 1581, Wellington. Meetings are held the 2nd Tuesday each month at 7.30 p.m., Block 2, VICTORIA UNIVERSITY.

CHRISTCHURCH MICROPROCESSOR USERS GROUP: J. D. Mann, 330 Centaurus Rd, Cashmere, Christchurch. Phone (03) 325-652.

CHRISTCHURCH '80 USERS GROUP: David Smith, P.O. Box 4118, Christchurch, Phone (03) 63-111 (h).

CHRISTCHURCH PEGASUS USERS GROUP: Don Smith, 53 Farquhars Rd, Redwood, Christchurch, Phone (03) 526-994 (h), 64-544 (w), ZL3AFP.

CHRISTCHURCH APPLE USERS Group: Paul Neiderer, C/- P.O. Box 1472, Christchurch, Phone (03) 796-100 (w).

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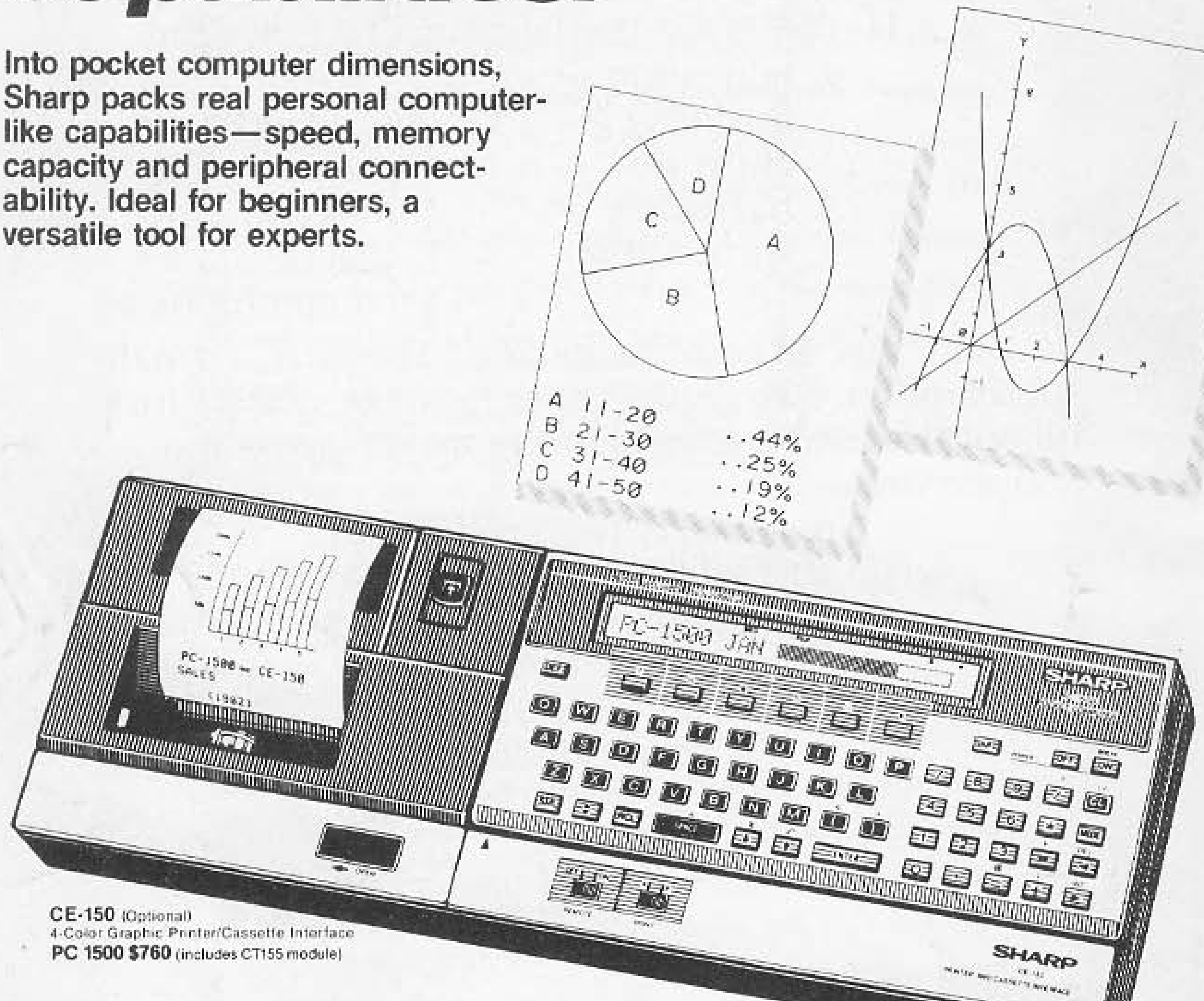

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